FOOD MANUFACTURE

Incorporating Food Industries Weekly

ARD HILL LIMITED, STRATFORD HOUSE, 9 EDEN STREET, LONDON, N.W.1. DECEMBER 1, 1955

30:12

'THIRD DEGREE'

GOODELL LIBRARY
DEC 21 1955
UNIVERSITY OF MASSACHUSETTS

"My pal at the mills says they've found out those Hijaluka traps aren't too hot. We tested a Hijaluka trap, didn't we, Chief?"

"*Uhh-h-h! Look at it!*"

"How d'you find out it wasn't much good in such a short time, Chief?"

"*Gave it the third degree, my lad. Put it on a quick heat job with discharge to atmosphere.*"

"*Traps can fall down two ways, Son. Maybe they don't work at all. Maybe they work but don't keep on doing it. Give 'em the third degree straight off and if they stand up to that, leave them on the job and watch 'em every month. When they keep on working right for 7-10 years they're up to Drayton/Armstrong standard.*"

"Third Degree" in a Metropolitan Hospital

Report 13th Jan. 1955

Called here as above memo re Drayton Armstrongs replacing **** traps on a Manlove Alliot three roll calender. The **** traps worked for about 9 months and Mr. T. says that from then on they have been a constant source of trouble and have had constant attention. They now have D/A 212 on the rollers and D/A H00 which are to be replaced by D/A 211 on the gap piece. They have all D/A in here and say that Drayton make their traps too well. Since fitting D/A's T. says that the ironer has a much higher efficiency, higher temperature on the rolls and more output per hour, and no maintenance. In 6 years D/A's installed have not been looked at.

(*The report can be inspected*)

Department Food Technology
University of Massachusetts
Amherst, Massachusetts

DRAYTON

STEAM TRAPS

DRAYTON REGULATOR & INSTRUMENT CO. LTD., WEST DRAYTON, MIDDLESEX. (West Drayton 2611)

DA44

Fully

Decorated Tins

in all shapes and sizes

The Metal Box Company is well-known for the production of highly decorated boxes for the confectionery trade. These attractive containers, with their full-colour surface decoration and their suitability for re-use, make an immediate appeal to the purchasing public. The Company's design service and technical advice covers many types of package, including flexible film and film and foil laminates, as well as metal containers, cartons and composite containers. For Metal Box offers the complete packaging service and its know-how is at the disposal of all manufacturers with a packaging problem to solve.

Metal Box
know-how
does count!

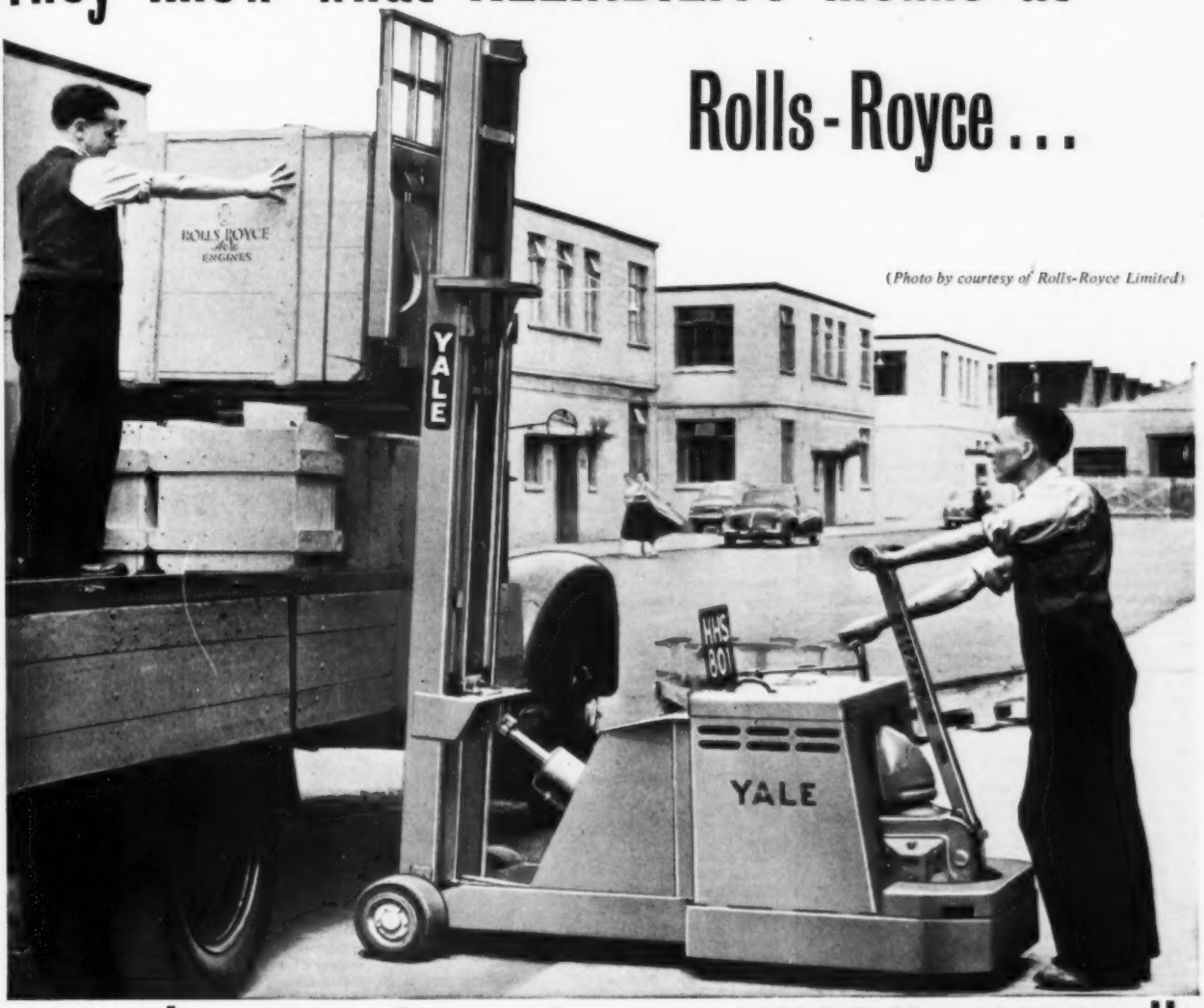
THE METAL BOX COMPANY LIMITED

Metal Containers · Paper Products · Flexible Packages · Plastic Films and Laminates

THE LANGHAM · PORTLAND PLACE · LONDON W.1

MB3338A

They know what RELIABILITY means at Rolls-Royce...



(Photo by courtesy of Rolls-Royce Limited)

–that's why they choose "WORKSAVERS"

- **Simple, safe fingertip controls**
- **Can be ridden or walked**
- **Accessibility for quick maintenance**
- **Low initial and running costs**
- **Fork Lift, Pallet, Platform and Tractor Models**

Reliability is a quality they understand at Rolls-Royce. That's why they entrust the loading of these aero engine parts and other valuable products to YALE Worksavers — the trucks designed against breakdowns. Compact and robust, Worksavers economically carry and stack loads up to 3,000 lbs. They can work in confined spaces, and over low-load floors, and can safely be taken to upper floors by lift. *Please write for full details: we will gladly arrange a demonstration at your works.*

YALE
REGISTERED TRADE MARK

Materials Handling Equipment

YALE & TOWNE make the world's largest, most comprehensive range of materials handling equipment – including 1000 lbs. to 100,000 lbs. capacity power trucks.

THE YALE & TOWNE MANUFACTURING COMPANY • MATERIALS HANDLING DIVISION • DEPT. AC12 • WEDNESFIELD • STAFFORDSHIRE • ENGLAND. TELEPHONE: WILLENHALL 630

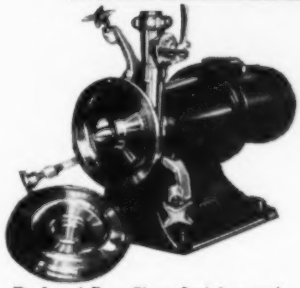
Index to ADVERTISERS

	page
Abix (Metal Industries), Ltd.	xcvii
Advance Linen Services, Ltd	May
Advita, Ltd.	lxxv
Aerox, Ltd.	I
Agricultural & Chemical Products, Ltd.	cvii
Air Control Installations, Ltd.	Oct.
Air Drying & Conditioning Ltd.	vi
Airguard, Ltd.	civ
Albro Fillers & Engg. Co., Ltd.	ci
Alfa-Laval Co., Ltd.	v
Alite Machines, Ltd.	cviii
Allen, Stafford, & Sons, Ltd.	Nov.
Allspeeds, Ltd.	Nov.
Aluminium Union, Ltd.	lxvii
Angel Warehouse Co., Ltd.	cvi
Anglo-Italian Preserves, Ltd.	June
Anhydro, A/S	xcii
A.P.V. Co., Ltd.	xxiii
Arabol Mnfg. Co., Ltd.	xcii
Associated Metal Works, Ltd.	xcvi
Bakers' & Confectioners' Exhibition	Aug.
Baldwin Instrument Co., Ltd.	xcix
Barron, W. S., & Sons, Ltd.	xc
Bayer Products, Ltd.	Nov.
Bear Honey Co., Ltd.	cviii
Beddington Nut & Produce Co., Ltd.	civ
Begg, Cousland & Co., Ltd.	xc
Bellingham & Stanley, Ltd.	cii
Benjamin Electric, Ltd.	Oct.
Bennett Sons & Shears, Ltd.	Nov.
Benton & Stone, Ltd.	July
Berite, Ltd.	Nov.
Bertrams, Ltd.	xcvii
Betts & Co., Ltd.	Nov.
Birmingham Chemical Co., Ltd.	Aug.
Blakesley, D. F., & Co.	xcii
Blaw Knox, Ltd.	Nov.
Bliss, E. W., (England), Ltd.	xxxi
Boehm, Fredk., Ltd.	xcix
Bos, F., Ltd.	July
Bowaters Sales Co,. Ltd.	xliv-xlv
Bowser, Monks & Whitehouse, Ltd.	Mar.
Braby, Fredk., & Co., Ltd.	xlii
Bramigk & Co., Ltd.	Nov.
Bramwell, S., & Co., Ltd.	lxxxvi
Brewers' Foods Supply Co., Ltd.	Mar.
Brierley, Wm., Collier & Hartley, Ltd.	lxxxiv
British Belting & Asbestos, Ltd.	Nov.
British Celanese, Ltd.	Nov.
British Cellophane, Ltd.	xxvi
British Electrical Development Association	xlviii
British Hydrological Corporation	Nov.
B.I.P. Chemicals, Ltd.	Mar.
British Food Fair	July
British Industries Fair	Oct.
British Jeffrey-Diamond, Ltd.	Nov.
British Rayophane, Ltd.	lxxxvi
British Road Services, Ltd.	xl
British Soya Products Ltd.	Oct.
British Steam Specialties, Ltd.	Sept.
British Thomson-Houston Co. (Rugby)	Nov.
British Visqueen, Ltd.	Oct.
British Wedge Wire Co., Ltd.	May
Broadbent, Thomas, & Sons, Ltd.	Nov.
Brockhouse Heater Co., Ltd.	Nov.
Brook Motors, Ltd.	Nov.
Brown & Forth, Ltd.	Nov.
Brown & Polson, Ltd.	Oct.
Bryan, Wm., Ltd.	lxxx
Bulmer, H. P., & Co., Ltd.	Mar.
Bush, W. J., & Co., Ltd.	Nov.
Butterfield, W. P., Ltd.	lxix
Caleb Duckworth, Ltd.	Nov.
Calfos, Ltd.	Nov.
Cambitizi, G., & Co., Ltd.	Nov.
Cambridge Instrument Co., Ltd.	Oct.
Canning Town Glass Works, Ltd.	xcii
Caribbean Commercial Agency	Oct.
Cashmore, John, Ltd.	civ
Cellulose Development Corpn., Ltd.	June
Chamberlain & Willows	civ
Cinema-Television, Ltd.	xxvii
Clarke-Built, Ltd.	Sept.
Clark, George, & Co., Ltd.	June
Clark, T. & C., Co., Ltd.	xcv
Clemens & Vogl	July
Coates Bros. Inks, Ltd.	Nov.
Cohen, George, Sons & Co., Ltd.	Nov.
Collets Bookshop, Ltd.	Nov.
Colt Ventilation Ltd.	xxxv
Commer Cars, Ltd.	xxxvi
Confectioners' Vegetable Colours & Fruit Essence Co., Ltd.	c
Coniston Co.	Nov.
Constantin (Engineers), Ltd.	July
Coombs, H. A., Ltd.	April
Cooper, McDougall & Robertson, Ltd.	Sept.
Corn Products Co., Ltd.	Oct.
Craigmillar & British Creameries, Ltd.	lviii
Creamery Package Mnfg. Co., Ltd.	Nov.
Crofts (Engineers), Ltd.	xli
Crompton Parkinson, Ltd.	July
Cuxson Gerrard & Co., Ltd.	xcviii
Dale, John, Ltd.	xxxii
Danks, Edwin, & Co., Ltd.	xiv
Davey, Paxman, & Co., Ltd.	ci
Dawson Bros., Ltd.	Nov.
Demby, Hamilton & Co., Ltd.	Nov.
Denton Edwards Paints, Ltd.	lxxvii
Dickinson, John, & Co., Ltd.	lxxxi
D.M.P. Sales, Ltd.	xxii
Dodge Bros., (Britain), Ltd.	xxx
Dodman, Alfred, & Co., Ltd.	xcv
Downton, John, (Electric), Ltd.	June
Drakesons	cvii
Drayton Regulator & Instrument Co.	Cover i
Duche, T. M., & Sons, Ltd.	lxxxviii
Edwards, F. J., Ltd.	Sept.
Electropower Gears, Ltd.	lxxviii
Electrothermal Engg. Co., Ltd.	Nov.
Electrolux, Ltd.	Oct.
English Electric Co., Ltd.	xvi
English Grains Co., Ltd.	Nov.
Evan Cook's Packer, Ltd.	Oct.
Evans, Wm., & Co., Ltd.	xliii
Everitt & Co., Ltd.	Oct.
Fatoils, Ltd.	cii
Feaver, John, Ltd.	Oct.
Felber, Jucker, & Co., Ltd.	lxxxvi
Fenner, J. H., & Co., Ltd.	xxviii
Finch & Knight, Ltd.	April
Findus, Ltd.	x, xi
Fisher's Foils, Ltd.	xlix
Fison, Edward, Ltd.	xx
Flexible Packaging, Ltd.	lxxii
Flexo Plywood Industries, Ltd.	April
Foster Instrument Co., Ltd.	Oct.
Foster Instrument Co., Ltd.	Oct.
Fox, Samuel, & Co., Ltd.	Aug.
Fraser, J., & Son, Ltd.	Nov.
Fuller Horsey, Sons & Cassell	cii
Gardner, Wm., & Sons, (Glos.), Ltd.	lx
Garvin, L., & Co., Ltd.	cviii
Gas Council	Oct.
G. C. Engineering Co., Ltd.	April
Gee Manufacturing Co., Ltd.	lvi
General Electric Co., Ltd.	liv
General Engineering Co. (Radcliffe), Ltd.	lxxix
Gerbig G.m.b.H., Wilhelm	Mar.
Giusti, T. & Son, Ltd.	lxxviii
Gloy & Empire Adhesives, Ltd.	Sept.
Goring Kerr, Ltd.	July
Gosheron, John, & Co., Ltd.	lxxvii
Graham & Co., Ltd.	April
Greening, N., & Sons, Ltd.	Nov.
Grew, James, & Co., Ltd.	cii
Gunson, R. W., (Seeds), Ltd.	Nov.
G.W.B. Furnaces, Ltd.	xci
Hacoma, Ltd.	xciv
Haller & Phillips, Ltd.	xci
Hamburger, M., & Sons	xciv
Hanover Fair	Mar.
Hanovia, Ltd.	Oct.
Hansella Machinery & Packaging, Ltd.	Aug.
Hardaker, John T., Ltd.	lxxxii
Harradine, J., & Sons, Ltd.	xix
Harvey, G. A., Ltd.	lxxix
Havinden, G., Ltd.	June
Hawker & Co.	Nov.
Heston Equipment Co., Ltd.	Nov.
H.M. Stationery Office	May
Hogg, Thos.	Nov.
Holden & Brooke, Ltd.	Sept.
Holland, W. L., Ltd.	Nov.
Honeywell-Brown, Ltd.	Nov.
Hopkin & Williams, Ltd.	April
Hopkinsons, Ltd.	Nov.
Howard Pneumatic Engg. Co., Ltd.	lxxxvii
Howards (Colney), Ltd.	Nov.
Howards of Ilford, Ltd.	lii
Hull Development Committee	Mar.
Hunt, John, (Bolton), Ltd.	lxxxix
Hunt Partners, Ltd.	xv
Imperial Chemical Industries, Ltd.	Cover iii, xviii
Incinerator Co., Ltd.	April
Industrial Products (Speco), Ltd.	Mar.
International Combustion Ltd.	lvii
Ivor Power Specialty Co., Ltd.	Nov.
J. & R. (Butchers) Supplies, Ltd.	April
Jackson Henry (Liverpool), Ltd.	Nov.
Jenkins, Robert, & Co., Ltd.	Nov.
Jenner, A. & C., Ltd.	Nov.
Job Day & Sons, Ltd.	Feb.
Johnson, A., & Co., (London), Ltd.	June
Jones Cranes	Nov.
Jones, Samuel, & Co., Ltd.	Sept.
Kane, Frederick C.	Feb.
Kek, Ltd.	xciii
Kellie, R., & Son, Ltd.	lxxi
Kemball, Bishop & Co., Ltd.	Nov.
Kemp, Frank, Ltd.	Nov.
Kestner Evaporator & Engg. Co., Ltd.	Nov.
Kimpton Bros., Ltd.	Oct.
Kleenkut Bindings Co., Ltd.	cii
Kneeda Mnfg. Co., Ltd.	ciii
Kustner Bros., Ltd.	Aug.
Lambert, L., & Co., Ltd.	Nov.
Lautier Fils, Ltd.	Nov.
Leiner, P., & Son, Ltd.	Nov.
Lidano, A/S	June
Loders & Nucoline, Ltd.	lxxiv
Loma Electronic Equipment, Ltd.	Sept.
London Oil Corporation, Ltd.	cviii
Longwood Engg. Co., Ltd.	Nov.
Magnetic Valve Co., Ltd.	Nov.
Maitlands (Metal Works), Ltd.	Nov.
Mark-o-Print, Ltd.	xciv
Marshall, A. L., (Carlton), Ltd.	Jan.
Mather & Platt, Ltd.	xvii
Matling, Ltd.	xxxvii
May & Baker, Ltd.	Nov.
Mayer, Newman & Co., Ltd.	Mar.
Measurement, Ltd.	lxii
Medway Corrugated Paper Co., Ltd.	xxv
Metafiltration Co., Ltd.	Nov.
Metal Box Co., Ltd.	Cover ii, lxxii
Metal Closures, Ltd.	Nov.
Mill Cleaning Services, Ltd.	July
Mitchell Engineering, Ltd.	xxxiii
Mono Pumps, Ltd.	Nov.
Monsanto Chemicals, Ltd.	Nov.
Morris, Herbert, Ltd.	July
Morton, Robert, & Co., Ltd.	Sept.
Myers & Foulkes	Oct.
National Adhesives, Ltd.	Nov.
National Glass Works (York), Ltd.	c
National Industrial Fuel Efficiency Service	Nov.
Negretti & Zambra, Ltd.	Nov.
Newnes, George, Ltd.	xcvi
Nipa Laboratories, Ltd.	Nov.
Norman Engg., Co.	lxxiii
Norwood, W., & Sons, Ltd.	Nov.
Nu-Swift, Ltd.	May
Opancol, Ltd.	April
Oppenheimer Casing Co. (U.K.), Ltd.	xlvi
Omerod Engineers, Ltd.	Nov.
Osborne Engineers, Ltd.	April
Oxo, Ltd.	Oct.
Packaging Exhibition	Jan.
Padley & Venables, Ltd.	Nov.
P.A.M., Ltd.	xciv
Parma Trade Fair	June
Pascall Engineering Co., Ltd.	Nov.
Passburg-Block-Haas, G.m.b.H.	Oct.
Payne, P. P., & Son, Ltd.	Oct.
Permoglaze, Ltd.	Nov.
Permutit Co., Ltd.	xxiv
Peters, G. D., Ltd.	li
Philips Electrical, Ltd.	Nov.

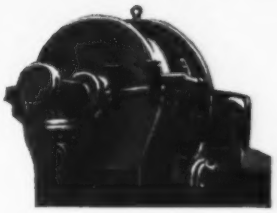
DE LAVAL

EQUIPMENT FOR THE STARCH INDUSTRIES

Installation of De Laval Starch Separators—Albion Sugar Co. Ltd



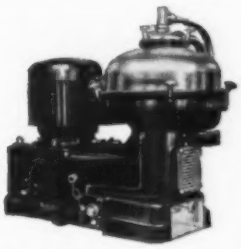
De Laval Easy Clean Stainless steel Centrifugal Pumps



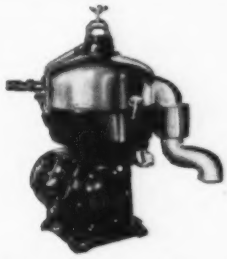
Rotosieve Continuous Self Cleaning Strainer—Solids Centrifugally Dehydrated

De Laval Plate Heat Exchanger for Preheating Mill Flow without Gelatinisation Also for heating and cooling in Dextrin manufacture

De Laval Starch Purifier 100 tons Maize per day to give below 0.32% Protein



De Laval Starch Purifier Capacity 200 tons/Maize per day or 80/100 M^3/Hour of Potato Starch Milk



De Laval Gluten Concentrator Capacities up to 50 M^3/h

DE LAVAL

OFFER SPECIAL STARCH PRODUCTION MACHINERY OR WILL DESIGN AND ENGINEER COMPLETE PLANTS

for Maize, Wheat, Potato, Rice Cassava, Sago, Arrowroot, Milo, Tapioca Starches

ALFA-LAVAL COMPANY LIMITED • GREAT WEST ROAD • BRENTFORD • MIDDLESEX

Index to ADVERTISERS

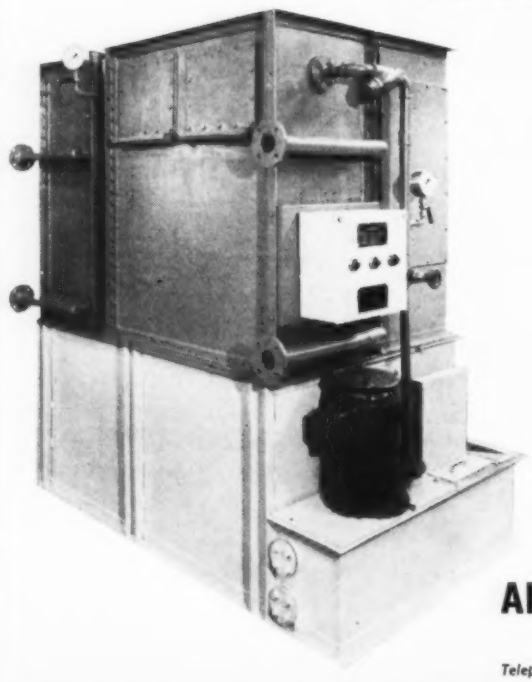
	Page
Pilkington Bros., Ltd.	Nov.
Plenty & Son, Ltd.	xcvi
Polak & Schwarz, Ltd.	Nov.
Pollard Bearings, Ltd.	xlvii
Porteus, G., & Sons, Ltd.	lxxxvii
Potter, F. W., & Soar, Ltd.	cii
Powell & Co.	Nov.
Powell Duffryn Carbon Products, Ltd.	Nov.
Power Jacks, Ltd.	Sept.
Premier Filterpress Co., Ltd.	c
Prestons, Ltd.	May
Pulsometer Engg. Co., Ltd.	cviii
Purdy Machinery Co., Ltd.	lxxxv
Pye, W. G., & Co., Ltd.	Jan.
Quickset Water Sealers, Ltd.	Oct.
Ransomes, Sims & Jeffries, Ltd.	lxxxi
Rapid Magnetic Machines, Ltd.	June
Rayner & Co., Ltd.	xxi
Realm Engineering Works, Ltd.	Nov.
Redler Conveyors, Ltd.	Nov.
Renold Chains, Ltd.	lix
Reynolds & Grayer, Ltd.	May
Roberts, David, & Son	May
Rotoplunge Pump Co., Ltd.	Jan.
Rowe Bros., & Co., Ltd.	June
R.T.S.C. Home Sales, Ltd.	Feb.
Rubber Improvement, Ltd.	May
Russell Construction, Ltd.	Jan.
Samuelson, P., & Co., Ltd.	Nov.
Sanders, H. G., & Son, Ltd.	lv
Sauven Perforating Machine Co.	Nov.
Saxon Engg. Co., Ltd.	Nov.
Scherer, R. P., Ltd.	Aug.
Sculthorp, R., & Co., Ltd.	July
Semtex, Ltd.	Nov.
Seyfried, John F., & Sons, Ltd.	Nov.
S.F.P. (Food Products), Ltd.	Nov.
Shell Chemical Co., Ltd.	xxxix
Short & Mason, Ltd.	Nov.
Silber, L. I., & Co., Ltd.	Oct.
Silverson Machines (Sales), Ltd.	Feb.
Simon, Henry, Ltd.	lxx
Sinex Engg. Co., Ltd.	Sept.
Skerman, C., & Co., Ltd.	cvii
SMALL ADVERTISEMENTS	cv-cvii
Small Electric Motors, Ltd.	Nov.
Sorenson, John R., & Co., Ltd.	Aug.
Soya Foods, Ltd.	xciii
Spencer Bonecourt & Clarkson, Ltd.	lxxxiii
Spirax-Sarco, Ltd.	ix
Spooner Food Machinery Engg. Co., Ltd.	June
Spring Grove Laundries, Ltd.	July
Stacey, Frank, & Co., Ltd.	cii
Star Welding, Ltd.	xc
Stelcon (Industrial Floors), Ltd.	Nov.
Stevenson & Howell, Ltd.	lxxxii
Stokes & Dalton, Ltd.	Nov.
Sturge, J. & E., Ltd.	lxxxix
Sturtevant Engineering Co., Ltd.	xii
Swift & Swallow, Ltd.	lxxxv
Talbot Stead Tube Co., Ltd.	lxv
Tate Bros.	Aug.
Taylor Rustless Fittings Co., Ltd.	Nov.
Teleflex Products, Ltd.	Mar.
Telegraph Construction & Maintenance Co., Ltd.	lxiv
Thames Board Mills, Ltd.	Sept.
Thomas, Richard, & Baldwins, Ltd.	Sept.
Thomas, W. K., & Co.	xcvi
Thompson & Capper (Wholesale), Ltd.	April
Thompson, John, (Dudley), Ltd.	Nov.
Thompson & Norris Mnfg. Co., Ltd.	liii
Tilghman's, Ltd.	lxxx
Transparent Paper, Ltd.	vii
Trapow, D., & Co., Ltd.	Nov.
T.S. (Office Equipment), Ltd.	lxxvi
Tunnel Glucose Refineries, Ltd.	Jan.
Union Food Machinery Co., Ltd.	Nov.
United Glass Bottle Mnfrs., Ltd.	Cover iv
United Indigo & Chemical Co., Ltd.	Nov.
United Steel Companies, Ltd.	Aug.
Universal Metal Products, Ltd.	Oct.
Usines Vermylen, S.A.	April
Valley Products (Lye), Ltd.	Aug.
Venesta, Ltd.	Nov.
Vickerys, Ltd.	xcviii
Viscose Development Co., Ltd.	xxxviii
Viskase, Ltd.	xiii
WAECO, Ltd. (Fumite Division)	c
Walker, Crosweller & Co., Ltd.	lxviii
Waller & Co., Ltd.	May
Warwick Production Co., Ltd.	xxix
Washington Chemical Co., Ltd.	Nov.
Watson, R. N., Ltd.	Sept.
Webster, Isaac, & Sons, Ltd.	Nov.
Weir, G. & J., Ltd.	lxiii
Wetter, J. C., & Co., Ltd.	ciii
Whiffen & Sons, Ltd.	Nov.
White, Tomkins & Courage, Ltd.	lxvi
Whittaker, Arthur	cvi
Willcox, W. H., & Co., Ltd.	xxxiv
Williams (Hounslow), Ltd.	lxxvi
Wingrove & Rogers, Ltd.	lxi
Wiseman, Alfred, & Co., Ltd.	April
Yale & Towne, Ltd.	iii, lxxxiii
York Shipley, Ltd.	Nov.
Yorkshire Engineering & Welding Co., Ltd.	Nov.
Youngman, W. C., Ltd.	viii, civ

The Facts are . . . . .

HUMIDITY CONTROL

by

Dehydrair REGD.



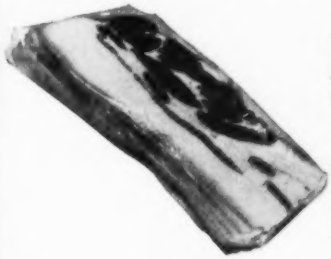
- LOWER CAPITAL COST
- LOWER MAINTENANCE
- LOWER RUNNING COST
- GREATER RELIABILITY
- GREATER DRYING

AIR DRYING & CONDITIONING LTD.

Office: 14 John Street, London, W.C.1.

Telephone: HOLborn 9735 Works: WEMBLEY MIDDLESEX

In DIOphane CELLULOSE FILM your product is SAFE, SEEN and SELECT!



SAFE *because all DIOphane films are dust- and greaseproof, some are moisture-proof, some even waterproof: and because DIOphane is enormously strong for its weight and thickness. Made in a number of types, there is a DIOphane film just right for packaging your product.*

SELECT *because DIOphane's glitter and sparkle have a magic effect on people's impulse to buy; because its standard range of brilliant colours and vivid multicolour printing make it the finest material in the world for making the eye-catching pack.*

SEEN *because DIOphane cellulose film is 95% transparent—more so even than window glass which is normally about 90% transparent. Your customers can carefully examine your product yet it remains as fresh and clean as when it left your factory.*

DIOphane CELLULOSE FILM means Buy Again

IMPORTANT

The development of prepacking food of all kinds in cellulose film is a continuous process. We wish to remind readers of the following two grades of DIOphane cellulose film.

MSADT DIOPHANE

This is a film which is moisture-proof heatsealing anchored on one side only—the other side being non-moistureproof PT. This special film for fresh cuts (beef, pork, veal, lamb) will, under the right conditions, maintain the colour of properly prepared fresh meat within reasonable limits.

GSAT DIOPHANE

This film has almost the breathing properties of PT film and yet is capable of being worked on heatsealing machinery. Specially suitable for cooked meats, bacon, meat pies, and certain types of cakes containing high moisture and/or high fat content, as well as for fresh vegetables.

Full particulars on request

and because your sales increase, DIOphane pays for itself!

SEND US YOUR ENQUIRIES; WRITE OR PHONE TODAY TO DEPARTMENT 20

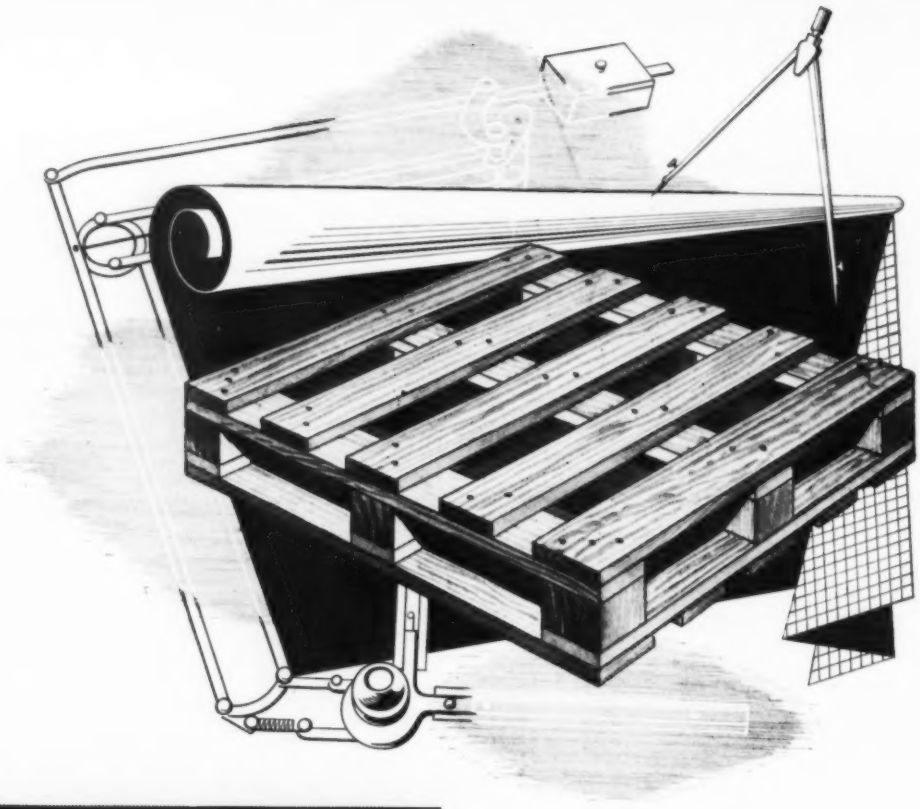
T.P.L

Agents throughout the world

TRANSPARENT PAPER LIMITED

HALIFAX HOUSE, 51/55 STRAND LONDON, W.C.2.

Telephone: Trafalgar 4311 Telegrams: Transpaper, Rand, London Cables. Transpaper, London



Youngman PALLETS

designed to carry food

Kiln-dried African hardwood, air-dried Swedish softwood, fresh-sawn English hardwood . . . These are three of the timbers we use regularly in the construction of pallets and stillages. Which should be used, for the greatest efficiency coupled with wise economy, in pallets which will carry prepared food in cartons? Should the pallets be slatted or not? If so, what is the correct gap between the slats?

We know all about these problems—and many others. And we know the right answers because pallets and stillages are our business. We are one of the largest manufacturers in the country, and we specialise in the manufacture of types to meet special requirements.

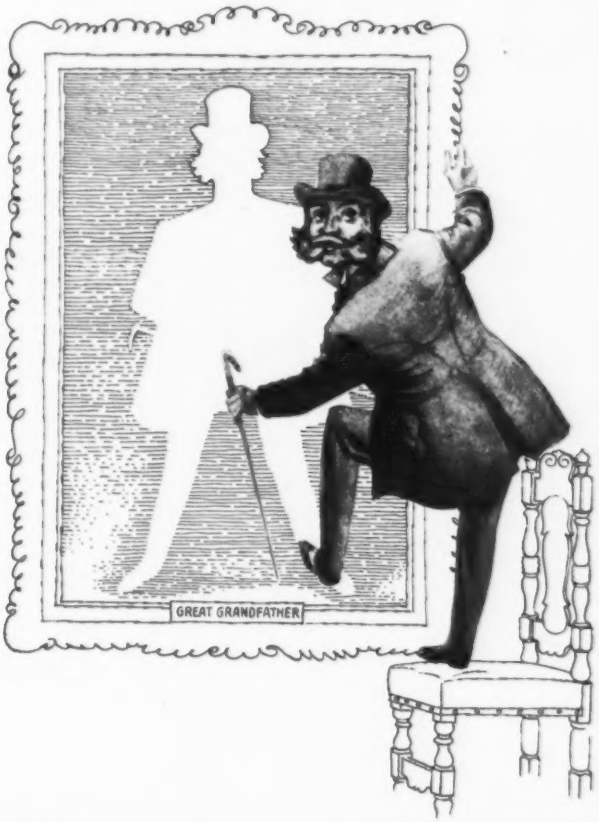
For the latest news of pallets and stillages, and other Materials Handling equipment see our Industrial Equipment list. You can receive it regularly by writing to Sales Dept. FM/PS.

W. C. YOUNGMAN LIMITED

MATERIALS HANDLING DIVISION

MANOR ROYAL, CRAWLEY, SUSSEX. TELEPHONE: CRAWLEY 1234 (5 LINES)

GREAT-GRANDFATHER HAS SPOKEN HIS MIND



"Well, I've said my piece for the year, gentlemen"

"If I wanted quicker morning starts I would first see that steam got round the mains quicker. This means better air venting of mains. Proper air venting of process plant would shorten my warming-up times.

"Quicker drying, quicker boiling, more production from my evaporators and other process steam units would follow from improved steam quality, and increased heat transfer by the removal of insulating films of water and air.

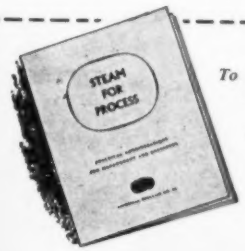
"By automatic temperature control I could reduce spoilage and labour costs.

"And I would ask Spirax-Sarco to look at my steam plant to see if they could suggest any improvements."

SPIRAX-SARCO STEAM CONTROL

SPIRAX-SARCO LTD., CHELTENHAM, Glos. *Phone: Cheltenham 5175-76* *Grams: Spirax, Cheltenham*
LONDON OFFICE: 28 Victoria Street, S.W.1. *Abbey* 6101-3832

REQUEST SLIP FOR FURTHER INFORMATION



To SPIRAX-SARCO LTD., CHELTENHAM, Glos.

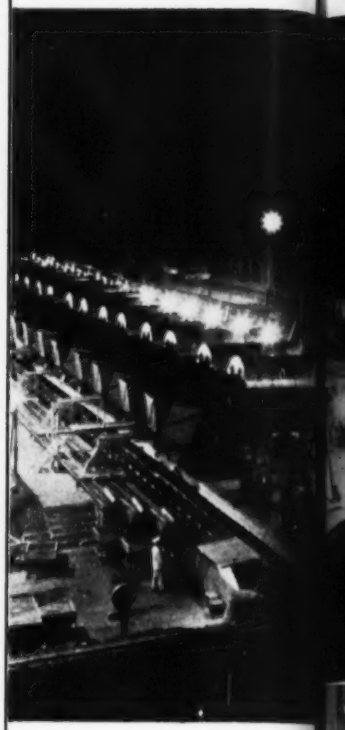
Please send Bulletin "Steam for Process"

NAME :

ADDRESS :

FM1255

30,000 tons a year



MODERN FARMS AND FACTORIES PRODUCE EUROPE'S FINEST PROCESSED FOODS

In the short space of 15 years Findus has quickly risen to be the leading producer of frozen and canned foods and preserves in Scandinavia.
Its manufacturing operations cover the whole area from Hammerfest — the most northerly town in the world — to Hälsingborg in the South of Sweden.

CHOICEST CROPS

Findus peas and other vegetables are grown in Southern Sweden — the perfect climate for succulent crops — using methods developed and proved on Findus' own 2,000 acre experimental farm.

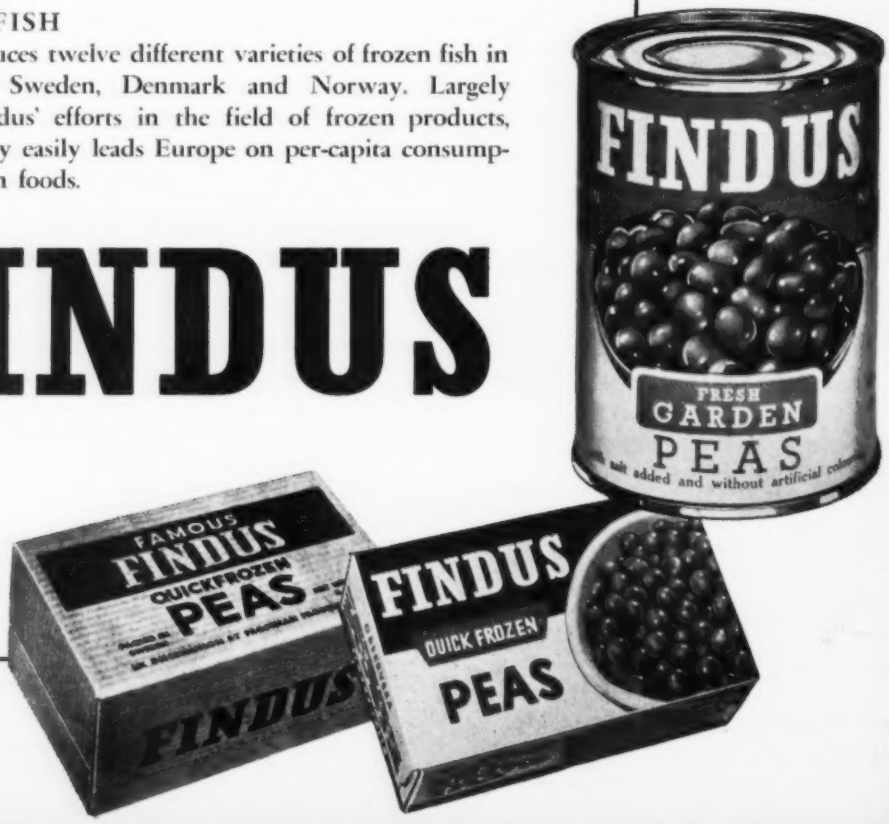
QUICK PROCESSING

Swift, mechanised harvesting, rapid transport to the nearby factory, and the latest canning and freezing equipment guarantee the prime quality of all Findus products.
Whether frozen or canned, Findus peas are processed within 3—4 hours from harvesting.

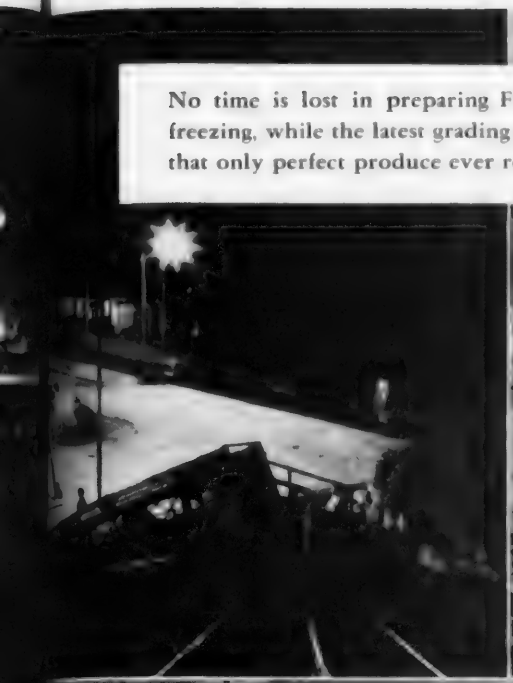
FROZEN FISH

Findus produces twelve different varieties of frozen fish in factories in Sweden, Denmark and Norway. Largely through Findus' efforts in the field of frozen products, Sweden today easily leads Europe on per-capita consumption of frozen foods.

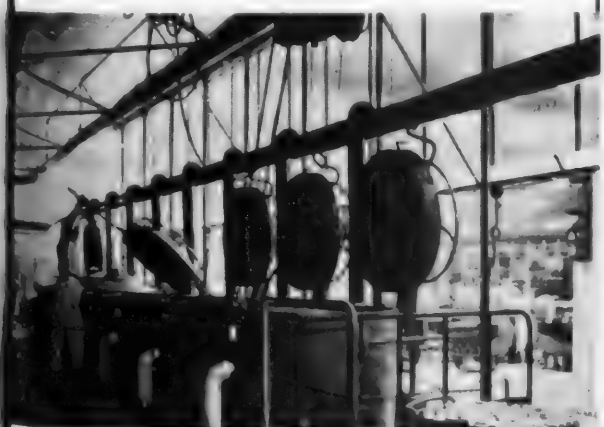
FINDUS



No time is lost in preparing Findus pea crops for canning or freezing, while the latest grading and cleaning equipment ensures that only perfect produce ever reaches the package.



Latest handling methods, including the hygienic plastic flumes shown here, speed up processing of Findus peas.

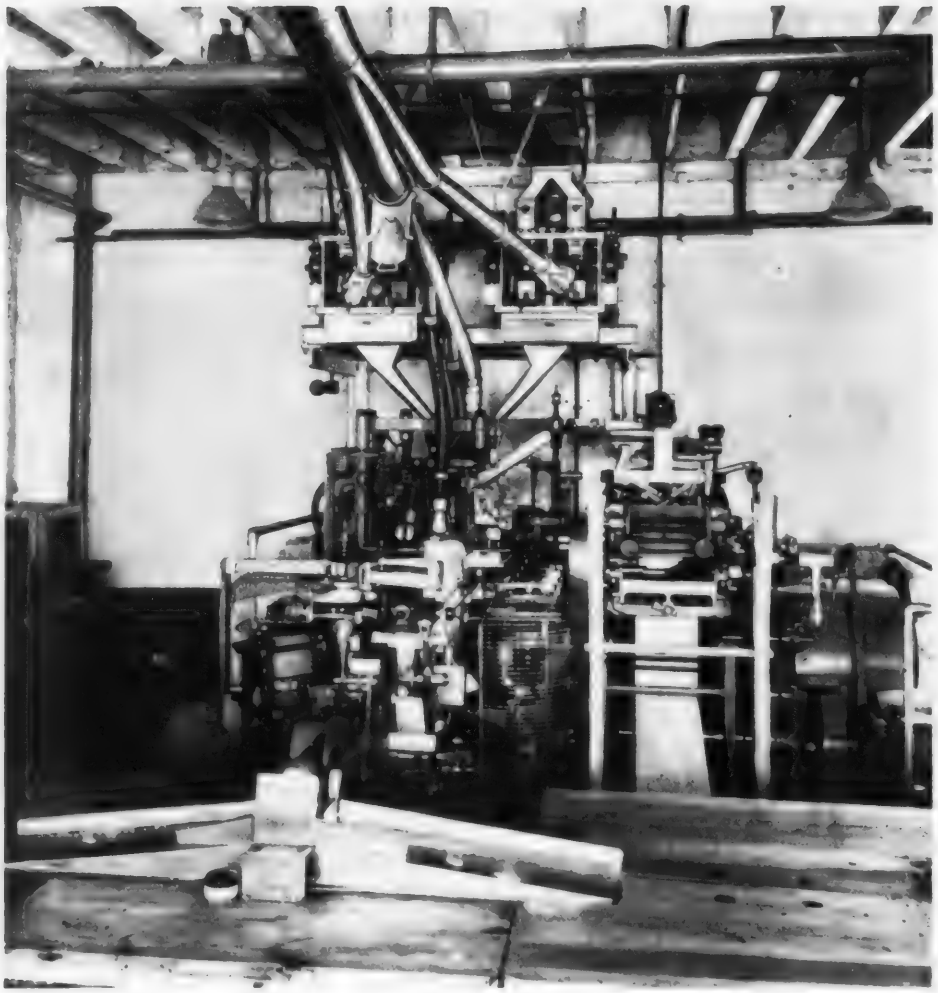


This summer Findus produced 750,000 cans and packages of processed and frozen peas — every day.

Among the most popular of Findus' wide variety of exports are 11 lbs. and 4×5 lbs. packs of peas.

OTHER PRODUCTS

Canned vegetables, soups, baby-foods, mayonnaise, jams and marmalades, frozen vegetables, fish, berries and pre-cooked foods.



A tea packeting machine equipped with Sturtevant dust exhausting system for the removal of fine dust.

Dust control at source by

STURTEVANT

The elimination of free dust emitted during production is essential in the food processing industry.

Dust particles vary considerably in texture and other characteristics but from our unique experience of over 60 years in this work we are able to determine the best methods of collection and disposal. Sturtevant Dust Collecting Plant tackles this problem throughout entire factories or at individual machines. Purpose-made exhaust hoods, and the correct design of each installation ensure efficient exhaust at all points even on the most complicated layout.

Our publication W.6507 " Pneumatic Dust Collecting and Conveying " is obtainable on request.

STURTEVANT ENGINEERING CO LTD

Southern House Cannon Street London E.C.4

Top Quality Products demand Top Quality Casings

at all times—specify

Prepared meats, hams, sausages, look better, sell better and are hygienically protected when displayed in Visking casings. Crystal-clear, colourfully transparent, or opaque, Visking casings are printed in colour for improved display appeal. See for yourself how much better your own products look when 'Visking' packed. Our Representative will call to give you a demonstration.

VISKASE

VISKING

CASINGS

"VISKING" IS THE REGISTERED TRADE MARK OF THE VISKING CORPORATION

VISKASE LTD · 40 CHANCERY LANE · LONDON, W.C.2 · Telephone: CHAncery 8111

EDWIN DANKS

SPECIAL VESSELS

FOR EVERY INDUSTRIAL PROCESS

including:

VULCANIZERS

DE-VULCANIZERS

VERTICAL AND HORIZONTAL MIXERS

REVOLVING KIERS

HARDENING CYLINDERS

HEAT EXCHANGERS

The illustration shows a Steam Jacketed Mixing Pan 4′ 6″ diameter by 5′ 0″ deep, fitted with stirrer gear operated by electric motor and reduction gear. This type of mixing pan can be made in any size to satisfy special requirements and working conditions. Vessels of the same design are supplied with or without steam jacket, or, alternatively, fitted with internal steam coils.

Manufactured in mild steel, stainless steel or mild steel with integrally clad material of stainless steel or monel.

OTHER MANUFACTURES:
Edwin Danks High Velocity Economic Boilers and all other types of Shell Boilers, complete Boiler House Installations, "Oldbury" Chain Grate Stokers, Structural Steel-work.

EDWIN DANKS & CO. (OLDBURY) LTD

OLDBURY NEAR BIRMINGHAM

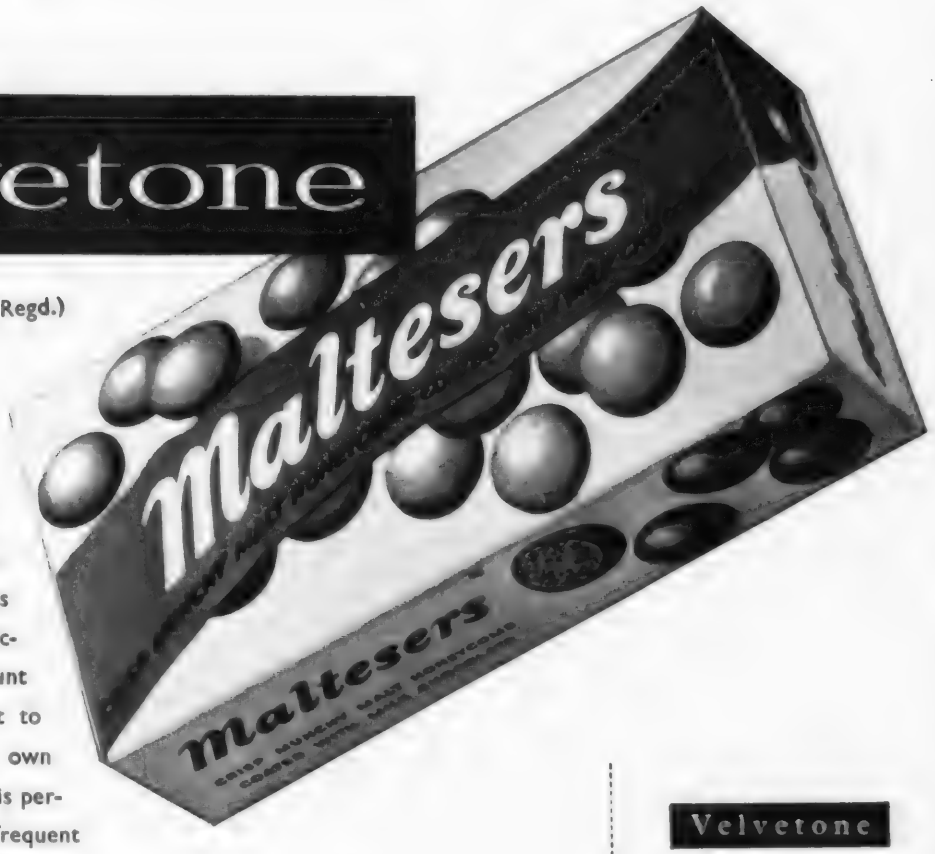
Telephones: Main Works, Broadwell 1381-6; Stoker Division, Brierley Hill 7731

LONDON · CARDIFF · MANCHESTER · LEEDS · NEWCASTLE · GLASGOW

IF YOU WANT REGULAR DELIVERIES

YOU WANT

Velvetone (Regd.)



To keep regular quantities of the new Malteser boxes moving through the Mars factory is no problem for Hunt Partners. Supplies are kept to schedule by using their own VELVETONE process which is perfectly suited to long, fast, and frequent runs in exacting colour work.

Multiple colours can be used, and the machines are suitable for producing practically any size and shape of carton and greaseproof or laminated for long runs.

Small alterations or additions to a main design can be made during a contract, thus reducing stocks held to a minimum.

Cartons are precision cut, and so can be machine packed at speed.

Velvetone

may well be the answer to one of your biggest headaches. Why not contact Hunt Partners for further information?

HUNT PARTNERS LIMITED

Folding and Rigid Boxes Designed and Printed by Every Modern Method

Head Office: CLAPTON, LONDON, E.5
Phone: AMHerst 3388

Also at BRYNMENYN, S. WALES
Phone: Aberkenfig 367

Smaller and more efficient

- Lower shaft centre heights
- ½ h.p. to 25 h.p. inclusive
- 4 frame diameters, new NEMA 1954/55 dimensions
- **Available from stock**
- *Publication DM/213 available on request*

The new **'LE'** *range of*

'ENGLISH ELECTRIC'

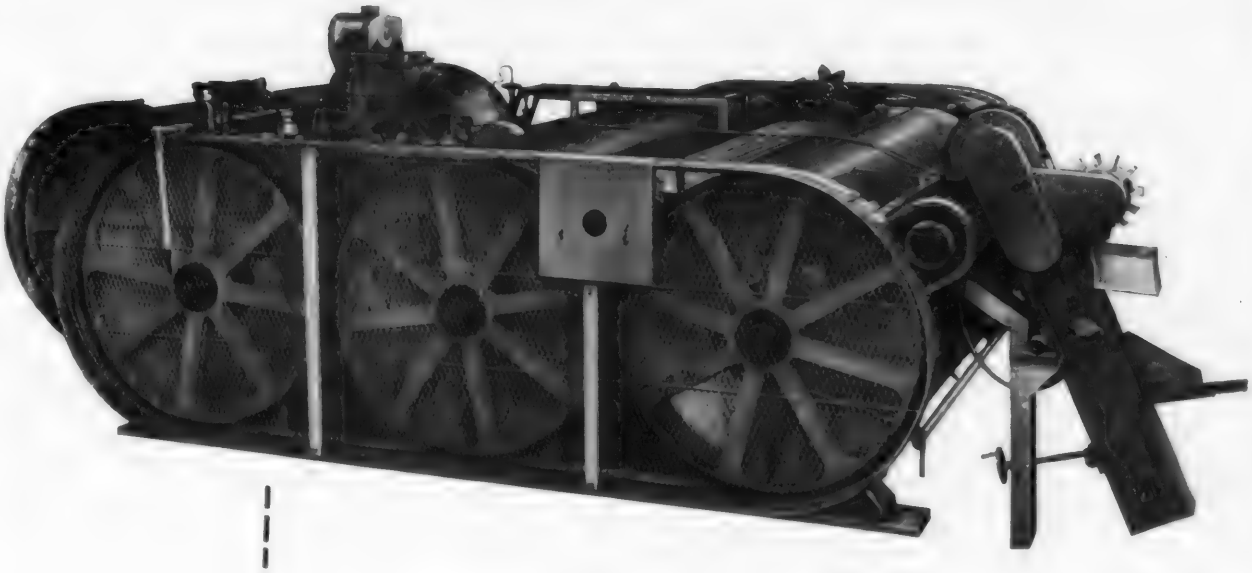
ventilated motors

THE ENGLISH ELECTRIC COMPANY LIMITED, QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

Industrial Motor Works, Bradford

WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

DM.40D5



another British engineering triumph . .

The Mather & Platt

Rotary Sterilizer

The machine illustrated above was recently installed in a well-known British cannery, and has an output of 400 cans per minute at an approximate cooking time of 19 minutes.

Mather and Platt Ltd. can offer a complete range of continuous cookers, including the following:

PRESSURE COOKERS

- Agitating Rotary Sterilizers.
- Non-Agitating M. & P. Cookers.
- Hydrostatic Cookers.

ATMOSPHERIC COOKERS

- Agitating Round Shell Cookers.
- Agitating Square Tank Cookers.
- Non-Agitating M. & P. Cookers.
- Hydrostatic Cookers.

507

Mather & Platt Ltd.

RADCLIFFE, MANCHESTER

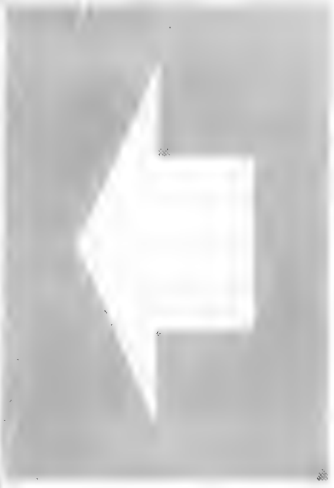
London Office: PARK HOUSE, 22 GREAT SMITH STREET, LONDON, S.W.1

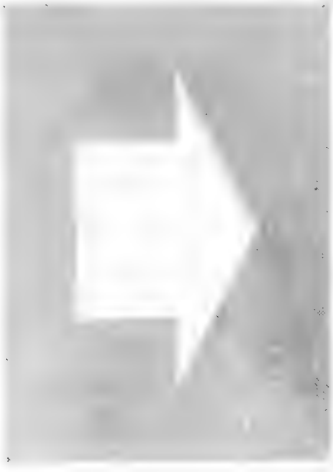
I.C.I. DENDRITIC SALT

—a NEW fine grade for foodstuffs

I.C.I. Dendritic Salt is a fine vacuum salt with a new crystal shape. It is soft and floury, with the following distinctive qualities—which are of special advantage in many applications in the food and dairy industries:

- Outstanding non-caking properties
- High purity—99.6% sodium chloride
- Blends well with other finely-divided materials
- Low-bulk density—ensuring good covering power
- Rapidly soluble in water





I.C.I. Dendritic Salt is of particular interest to users of Dairy or fine Crystal salt, since it not only offers technical advantages but is also cheaper.
Imperial Chemical Industries Ltd. are the sole manufacturers of Dendritic Salt, which is protected by patents in Great Britain and other countries throughout the world.

IMPERIAL CHEMICAL INDUSTRIES LTD.
LONDON, S.W.1

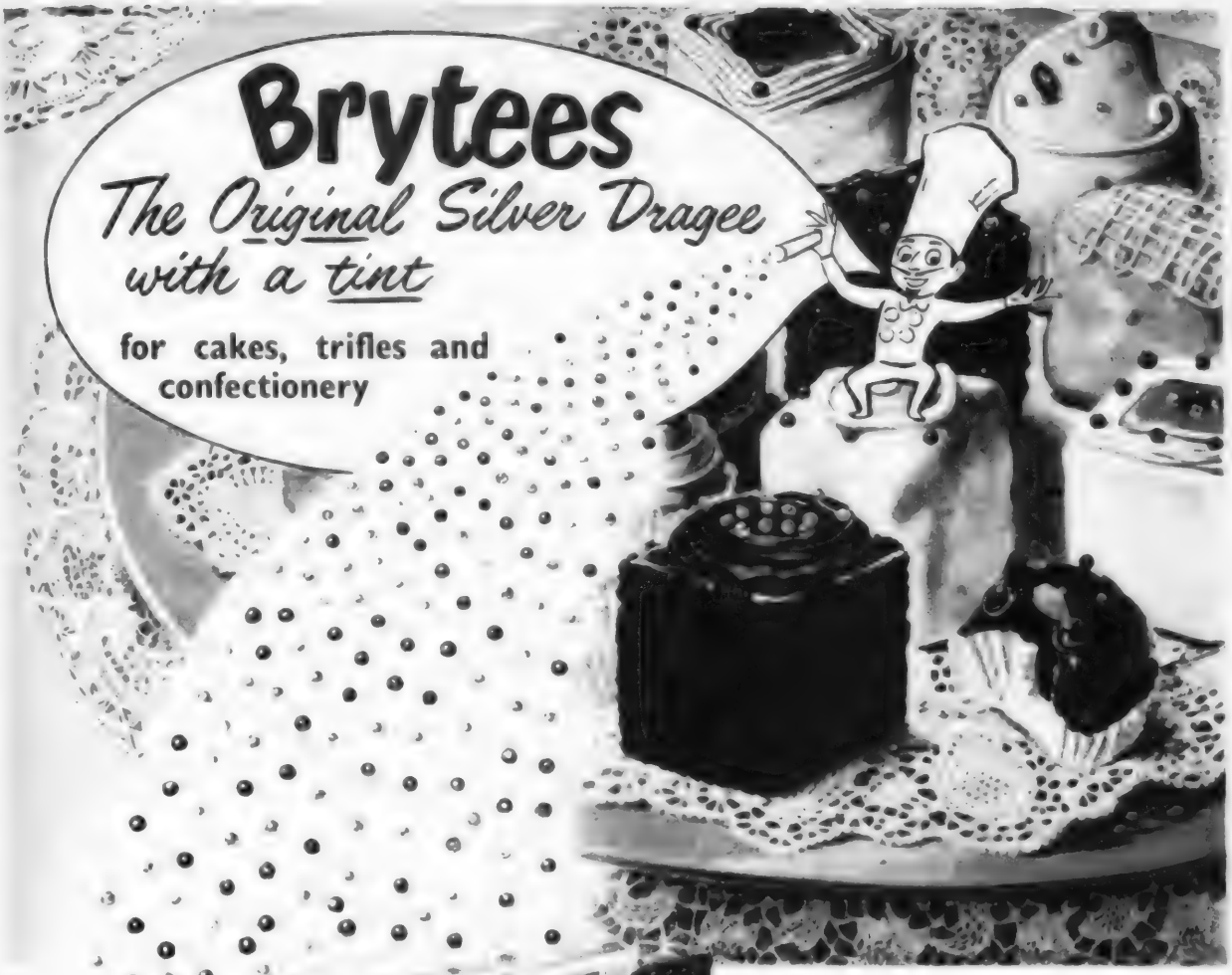
ICI

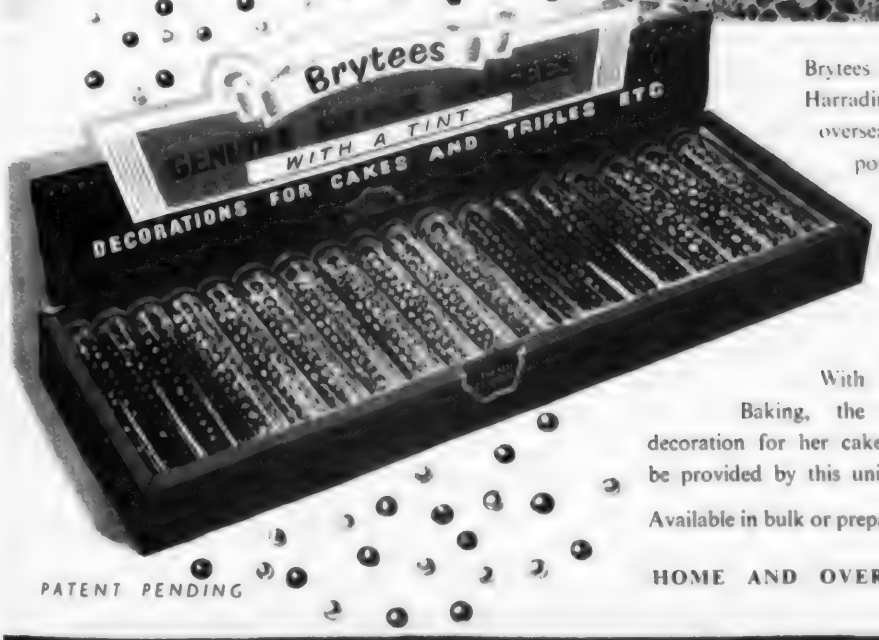
BS 9

Brytees

The Original Silver Dragee with a tint

for cakes, trifles and confectionery





PATENT PENDING

Brytees — so successfully introduced by Harradine's—are today being sold in 16 overseas markets where their established popularity demands frequent shipments.

These brilliant Silver Dragees in many different transluscent colours are fast becoming as famous as their counterpart the traditional St. James Silver Dragees.

With the rapid swing-back to Home Baking, the housewife seeks perfection in decoration for her cakes and party-table which can only be provided by this unique product.

Available in bulk or prepacked in this attractive display carton

HOME AND OVERSEAS ENQUIRIES INVITED

MALT EXTRACT

DRIED MALT EXTRACT POWDER

MALT FLOUR

An ever-increasing application to food industries

EDWARD FISON LIMITED

FACTORY CEDARS · STOWMARKET · SUFFOLK

Maltsters for more than a Century

Rayner's

essences and colourings
known for over
100 years as the best

RAYNER & CO., LTD., LONDON N.18

"GOLDEN GLOW" Dried Milk Powders, Full Cream and Separated, are the ideal ingredient for a wide range of food manufacturers. Expert advice on your specialised requirements will gladly be sent free on request.

Write to DEPT. A6.

D.M.P. SALES LTD., CENTRAL BUILDINGS, GUILDFORD

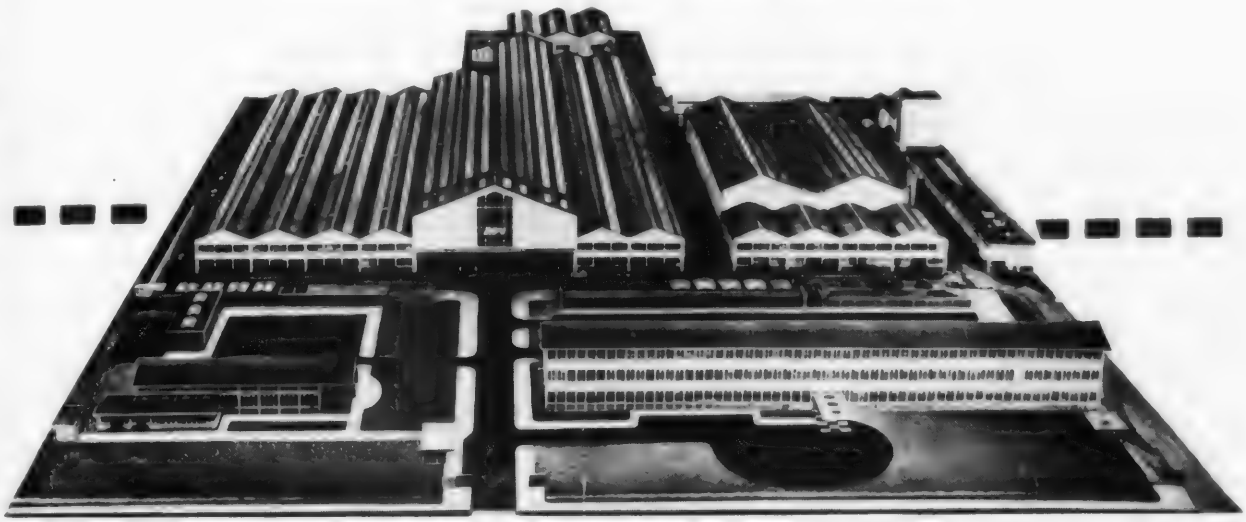
TELEPHONE GUILDFORD 2345

CENTRALISATION OF APV AT CRAWLEY

NOW COMPLETED+

1. Britain's most modern factory for the production of plant in the corrosion-resistant metals.

2. A complete process engineering organisation geared to the requirements of the food, dairy and potable liquid industries.



WITH the completion in December of the final stage of the three-year move from the previous four works, the A.P.V. Company becomes centralised at Crawley, Sussex, in one of the most modern production and process engineering units in this country.

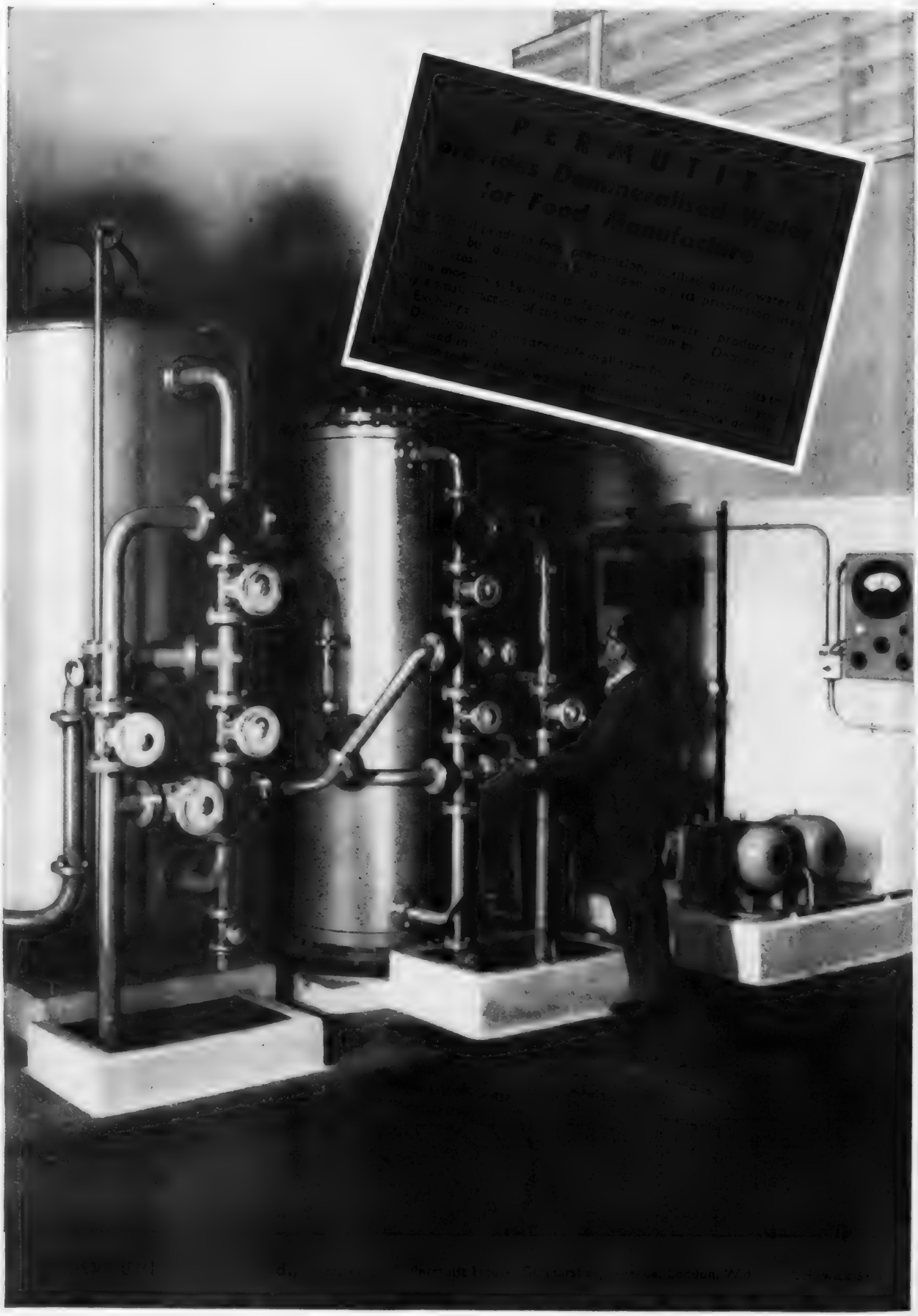
The factory, foundry, offices and laboratories on an 18½ acre site, house a team of 2,000 built up over the past forty years for the special purpose of designing, developing and producing plant in stainless steel, aluminium and the other corrosion-resistant metals for the liquid foodstuffs, beverage and chemical industries. With the exceptional facilities available APV is in a position to offer a service of a kind that is without parallel in this country.

In future all communications should be directed to the address below.

THE A.P.V. COMPANY LIMITED

Manor Royal, Crawley, Sussex · Telephone: Crawley 1360

APV

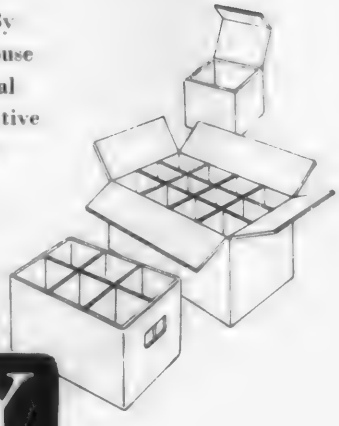

PERMUTIT
Previous Demineralised Water
for Food Manufacture

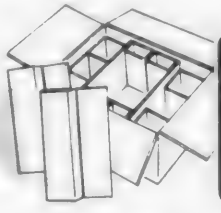
THE GEOMETRY OF PACKAGING

Squaring a circle

or package protection around the globe

Although squaring the circle may be a mathematical impossibility it is a fact that cubes, spheres and other less geometric shapes succumb to the skill of the expert designer of Medway corrugated fibreboard Cases. By really made-to-measure planning Medway Cases are made, not merely to house the shape of the product, however unsymmetrical, but to provide real protection against the handling and the hazards of transport. The protective quality of the tough, resilient corrugated board produces a shock-absorbing case light enough for air travel yet robust enough for any other method of transportation. Manufacturers choose Medway Cases for the ease of assembly and the maximum protection they provide. That is why they are widely used for package protection around the globe.





MEDWAY

THE CASE FOR BETTER PACKAGING

Reed

THE MEDWAY CORRUGATED PAPER CO. LTD., NEWHYTHE, MAIDSTONE, KENT

London Sales Office: Blackfriars House, New Bridge Street, London, E.C.4

APPLIED EXPERIENCE

WHEN British Cellophane Limited sells a roll of film — it may be "Cellophane" cellulose film, B.C.L. polythene or Courtaulds' cellulose acetate —the company is, nine times out of ten, indirectly involved in the sale of someone else's product as well. This is true of all packaging materials. It is especially true of those which face the final, searching test in the shops.

This is where the services of British Cellophane Limited come in. No producer of merchandise can employ a staff qualified in *all* aspects of the highly-specialised business of packaging. But he can do the next best thing—call upon the unrivalled knowledge and experience of the B.C.L. organisation's team of packaging specialists, scientists, engineers and designers.

British Cellophane Limited has behind it a wealth of packaging knowledge collected from its agents and associates in 47 countries. At home, the company is constantly adding to its considerable experience which embraces the packaging of every type of consumer product — from fresh meat to household textiles.

This unique organisation exists for a single purpose — to help the user of packaging films to get the best possible results from them.

With its ready assistance and advice, British Cellophane Limited is making a positive contribution to better packaging. And today, more than ever before, good packaging means good business.

AND NOW . . . COLODENSE

COLODENSE LIMITED, leading converters and high-quality printers of transparent cellulose film, are now a wholly-owned associate of British Cellophane Limited. More power to the B.C.L. film-user! Whether he needs "Cellophane" in rolls, in sheets, in bags, unprinted or printed in one colour . . . or printed in five colours . . . for wet or dry products . . . for frozen foods or fabrics . . . the B.C.L. organisation can supply it.

"CELLOPHANE" — the first packaging film — and the greatest!

BRITISH CELLOPHANE LIMITED

Commercial Offices: 12/13, CONDUIT STREET, LONDON W.1

Reg. Offices and Factory: BATH ROAD, BRIDGWATER, SOMERSET

"Cellophane" is the registered trade mark of British Cellophane Limited and denotes the brand of cellulose film manufactured by them

Cintel electronic metal detection

Just one small fragment of metal concealed somewhere within your products, but the CINTEL Metal Detector instantly pinpoints it and automatically ejects it.

Thus both your name and customer goodwill are fully protected—a fact that over 850 users of CINTEL Metal Detectors know to their advantage.

If you are not yet using CINTEL Detectors, why not write for full details now.

Cintel

CINEMA-TELEVISION Ltd.

WORSLEY BRIDGE ROAD · LONDON · SE26

Telephone HITher Green 4600

A Company within the Rank Organisation Limited.

SALES AND SERVICING AGENTS: F. C. Robinson & Partners Ltd., 122 Seymour Grove, Old Trafford, Manchester, 16 · Hawnt & Co., Ltd., 59 Moor St., Birmingham, 4 · Atkins, Robertson & Whiteford Ltd., 100 Torrisdale Street, Glasgow, S.2.

and NOW!
FENNER TAPER-LOCK SPROCKETS & CHAIN

The 'on and off in a minute' Fenner Taper-Lock principle has now been extended to chain sprockets.

Taper-Lock cuts out the laborious 'trial and error' method of fitting to shafts. Sprockets fitted with Taper-Lock Bushes can simply be slipped on the shaft and the flush fitting screws tightened. The shaft is then gripped with a 'shrunk-on' fit.

You can now obtain Sprockets fitted with Taper-Lock Bushes and a wide range of Fenner Roller Chain to use with them. Make up your chain drives to suit *your* needs. Fenner Taper-Lock Sprockets and Chain are available from stock at all the eighteen Fenner Branches.

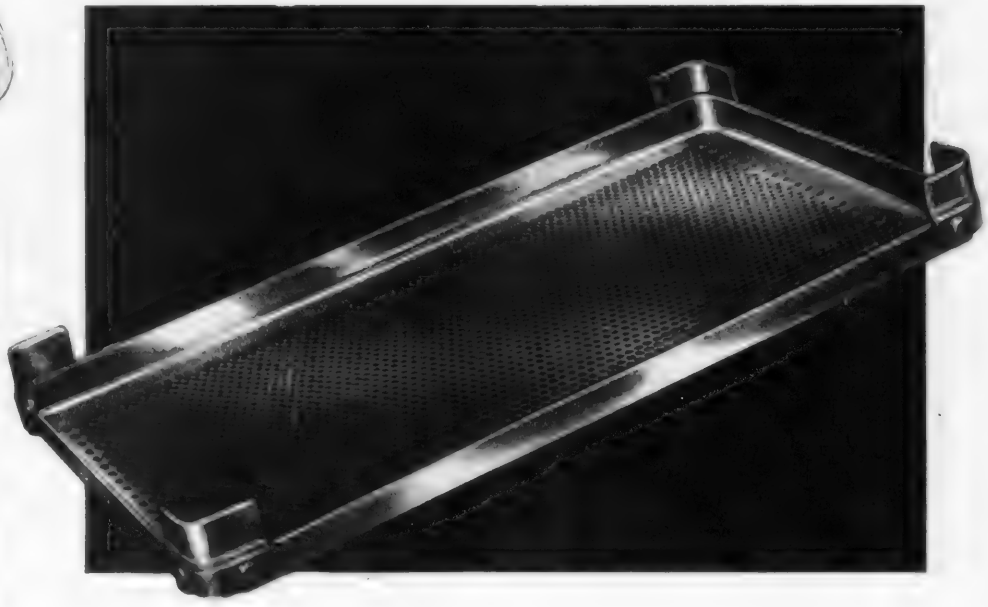
LARGEST MANUFACTURERS OF V-BELT DRIVES IN THE COMMONWEALTH

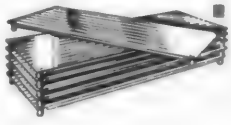
FENNER
OF HULL

BRANCHES AT BELFAST, BIRMINGHAM, BURNLEY, CARDIFF, CLECKHEATON, GLASGOW, HULL, LEEDS, LEICESTER, LIVERPOOL, LONDON, LUTON, MANCHESTER, NEWCASTLE-ON-TYNE, NOTTINGHAM, SHEFFIELD STOCKTON-ON-TEES, STOKE-ON-TRENT.

The CHIEF ENGINEER says—

"Give them plenty of air with WARWICK...





...Perforated Trays"

The illustration shows our standard tray T.27151 with perforated base and corner stacking brackets. Many of our extensive range of trays can also be supplied with perforated bases and stacking features—details given on request.

WARWICK PRODUCTION COMPANY LTD

IN ASSOCIATION WITH **ALMIN LIMITED** STOKE POGES · BUCKS

BIRMINGHAM ROAD, WARWICK **TELEPHONE: WARWICK 693-696**

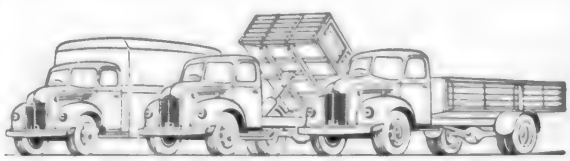
...IT'S DEPENDABLE...IT'S DURABLE

IT'S A DODGE!

from the tried and proved truck range

The collective experience of cost-conscious truck operators — at home and overseas — over a long period of time has given unqualified approval to the Dodge range of petrol and diesel models. This approval represents many millions of miles efficiently undertaken on a variety of hauling assignments, and an enormous amount of capital successfully invested.

The reason why these operators decide on Dodge is very simple. They see in its unrivalled combination of values the best in long life, in power and performance, and in economy. These characteristics of the Dodge are the practical outcome of an established policy of manufacturing up to a specification rather than down to a price. A comparison of specification details will convince you of its quality construction.

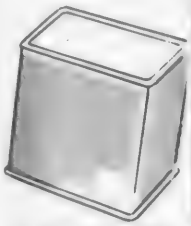


KEW DODGE

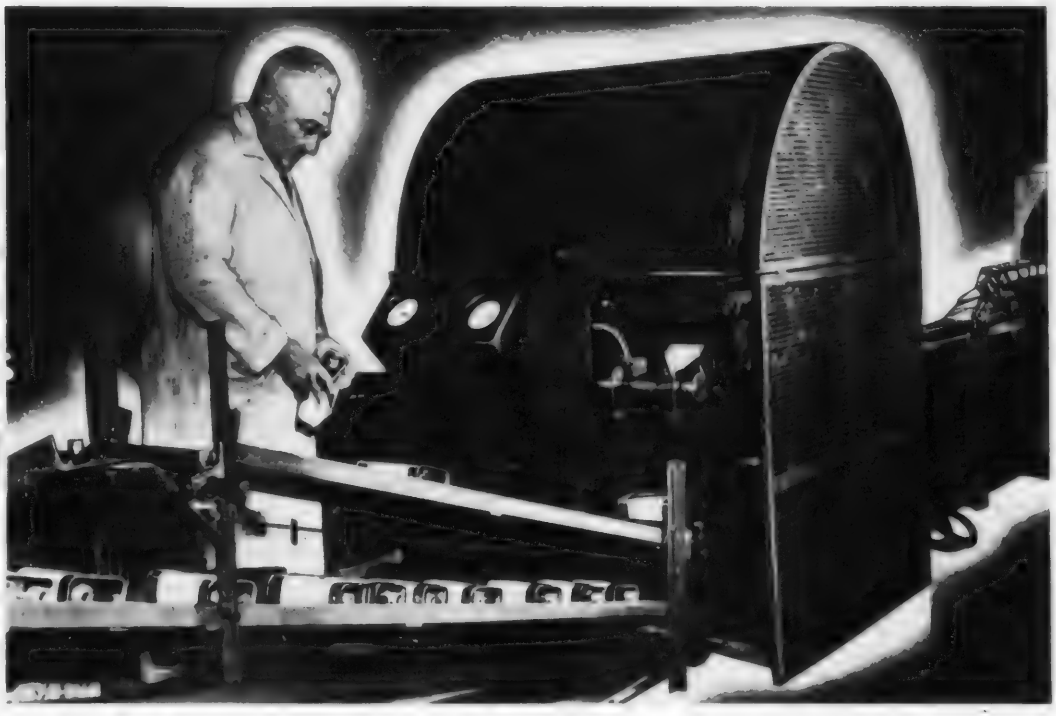
MODELS FROM 2 TO 8 TONS · PETROL AND DIESEL

DODGE BROTHERS (BRITAIN) LIMITED · KEW · SURREY

TESTS ROUND CANS FROM 2" to 4½" dia.



TESTS SQUARE AND RECTANGULAR CANS FROM 2⅜" to 4½" ACROSS CORNERS
(can be modified for larger sizes)



The BLISS 318 -- Here's a practical can tester for medium speed production lines

The 18 testing heads of the Bliss 318 handle round cans at up to a 150-per-minute rate ... square and rectangular cans up to 100 per minute, including those with handles and spouts.

SIMPLE, FULLPROOF TEST—As cans feed into the Bliss 318, they're enclosed by one of the 18 air-tight testing buckets. Compressed air is then pumped to the can. Even the slightest pinhole leak in the can will cause air pressure in the bucket to rise. When that happens the can is ejected automatically. It's a simple, thoroughly dependable way to eliminate "leakers."

COMPLETELY AUTOMATIC—The Bliss 318 Automatic Air Can Tester needs no operator. An electrically controlled stop-and-start feeding system completely eliminates jams—*automatically*. All cans are tested or passed or rejected—*automatically*. And the simple, rugged construction of the 318 means trouble-free performance, a minimum of maintenance.

COMPACT—Easy to install in your production line, the Bliss 318 only requires a floor space of approximately 5 × 6 ft.

E. W. BLISS (ENGLAND) LTD.

CITY ROAD · DERBY

Telephone: DERBY 45801

LONDON OFFICE:

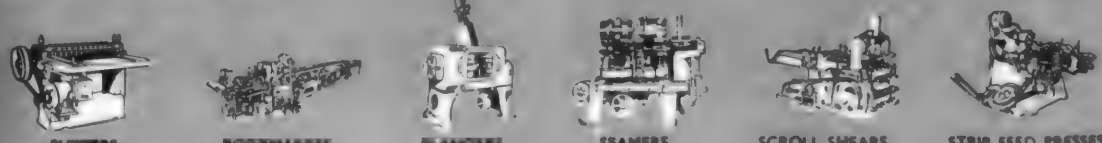
2/3, THE SANCTUARY, WESTMINSTER, S.W.1

Telephone: ABBEY 3651

B/26

BLISS on your machine is more than a name . . . *it's a guarantee!*

BLISS CAN AND CONTAINER MAKING MACHINERY



Food for thought!

FOOD IN TUBES IS
HYGIENIC, COMPACT,
EASIER TO HANDLE.

Tubes

for

food—

JOHN DALE LIMITED

NEW SOUTHGATE · LONDON · N.11

TELEPHONE: ENTERPRISE 1272

The

HYDRON

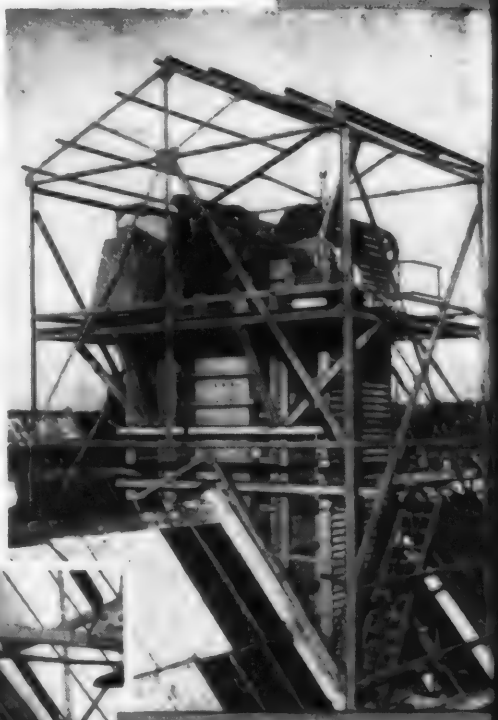
HYDROSTATIC STERILISER

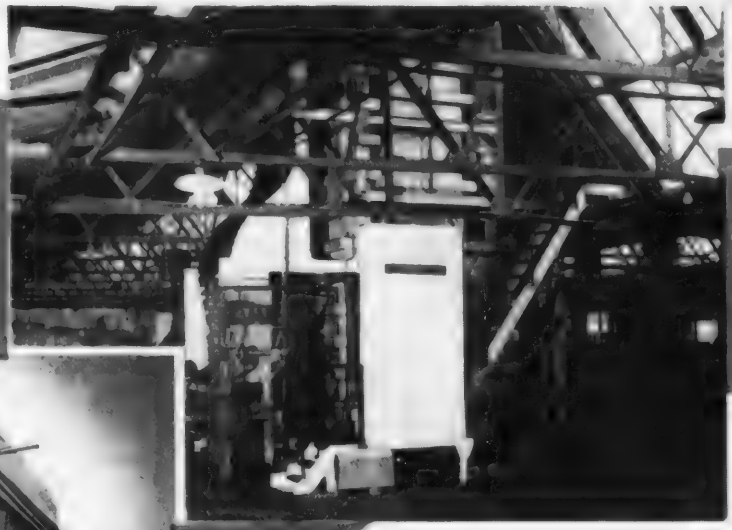
DESIGNED and Manufactured by:

MITCHELL ENGINEERING LTD.

in association with:

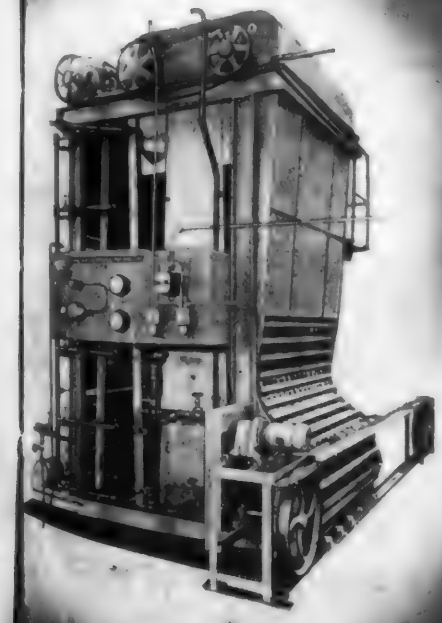
R. W. WEBSTER & CO. LTD.





for fruit

for vegetables



"A better machine than I have ever seen before"

A leading Canner

For full details write to:

MITCHELL ENGINEERING LTD., Food Machinery Division
7 GOWER STREET, LONDON, W.C.1.

R. W. WEBSTER & CO., LTD.
ABBEY IRONWORKS, WALTHAM CROSS, HERTS.

M.W.2

—for QUICK deliveries of all

ENGINEERING SUPPLIES

including

COCKS & VALVES
PACKINGS, JOINTINGS
BELTINGS, VEE-ROPES
OILS & GREASES
HOSES, FITTINGS, etc.

HOP 8022
25 lines

Write or 'phone

W. H. WILLCOX & CO. LTD
SOUTHWARK STREET, LONDON, S.E.1

COLT ventilation right from the start

AT PRICE'S (SOUTHERN CONFECTIONERS) BAKERY

Architect : A. J. Seal and Partners, F.R.I.B.A., Bournemouth and London

Ventilation is a matter for experts—a fact well appreciated by industrial architects. So the architect specified Colt Ventilation for the extension to Price's Bakery at Eastleigh—and consulted Colt at the planning stage. Colt technical staff prepared a natural ventilation scheme; sited Colt General Purpose Ventilators at low level for air inlet and Colt SRC. 2046 High Duty Extractors in the roof—directly over the main sources of heat and moisture.

Both extensions are now in full production in ideal ventilation conditions—achieved at low initial cost and without any running and maintenance costs.

Price's are one of over 8,000 major industrial organisations who have benefited from Colt's expert advice and wide range of ventilating systems.

COLT

WRITE FOR FREE MANUAL with full specifications of Colt Ventilators to Dept. S/42/270.

VENTILATION

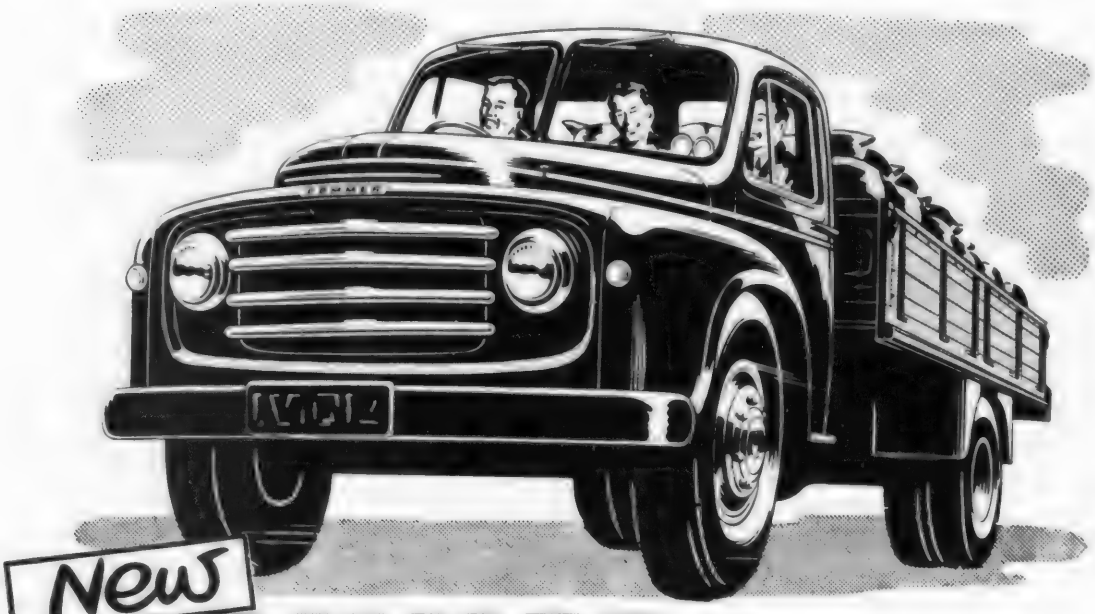
COLT VENTILATION LTD · SURBITON · SURREY

Telephone: Elmbridge 6511/5

Branches at Birmingham, Bradford, Bridgend (Glam.), Bristol, Coventry, Dublin, Edinburgh, Liverpool, London, Manchester, Newcastle-upon-Tyne, Sheffield and Warwick.

Agents in Australia, Belgian Congo, Canada, Cyprus, India, Indonesia, Madagascar, Malaya, Mauritius, New Zealand, Pakistan, Portugal, North and South Rhodesia and South Africa.

TOUGH! RELIABLE! SAFE! ECONOMICAL!



New

COMMER *Superpoise*

2-5 TON PETROL & DIESEL TRUCKS

DESIGNED for economy, built for reliability, the new range of Commer 2-3, 3-4 and 5 ton trucks embody insulated three-seater cabs of welded steel. New steering and improved suspension add to the merits of a well-proved chassis; a range of factory-built bodies containing a high proportion of steel is offered, as well as an optional overdrive for extra economy.

It will pay you to try COMMER before you buy. You'll have no regrets!

PRODUCTS OF THE ROOTES GROUP

COMMER CARS LTD. LUTON. EXPORT DIVISION: ROOTES LTD DEVONSHIRE HOUSE PICCADILLY LONDON W.1

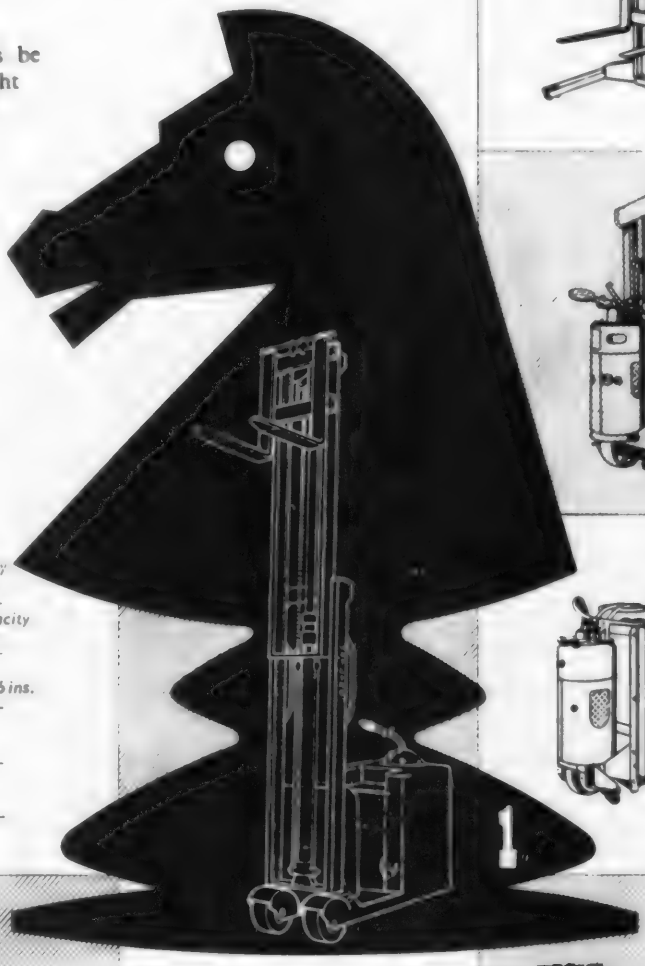
the right move!

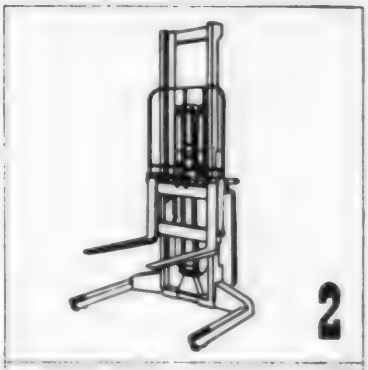
When you move goods and materials be sure you're moving them by the right methods — and in the right direction.

The Matling range* of trucks cover virtually every stacking and transporting need: they can be manoeuvred, turned around, loaded and unloaded in the narrowest possible and most confined spaces.

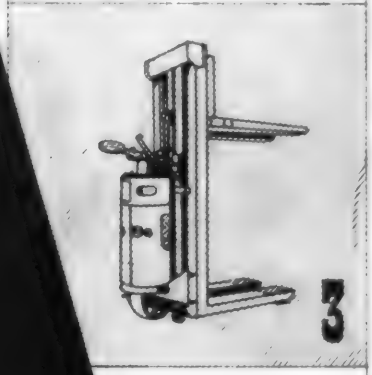
It's your move. Make a wise one . . . . get in touch with Matling about your problem — they *really* think before they recommend a move in any direction.

**Battery, petrol, or a.c. mains powered.*

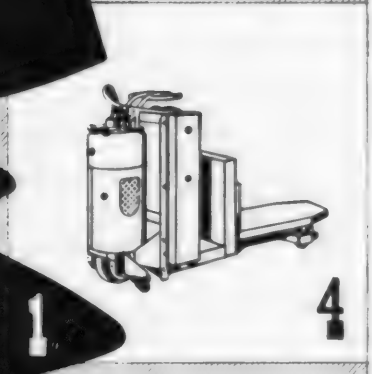




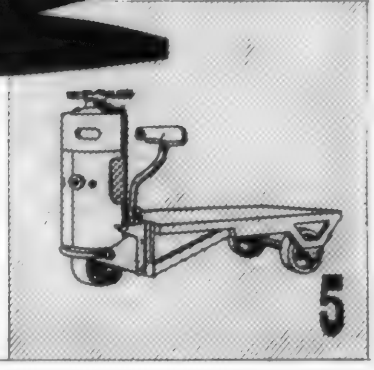
2



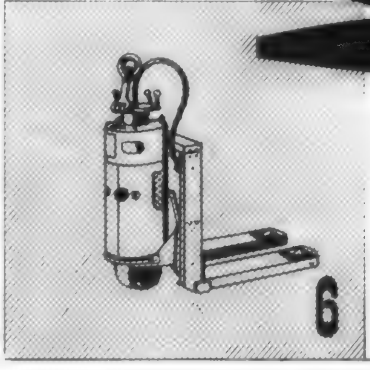
3



4



5



6

1	*Fork Lift Trucks Up to 2000 lbs. Capacity @ 24" load centres. Lifting up to 10ft.*
2	*Straddle Stackers Up to 3000 lbs. Capacity @ 20" load centres. Lifting up to 12ft.*
3	*Stackers Up to 3000 lbs. Capacity @ 20" load centres. Lifting up to 7ft. 6 ins.*
4	*Stillage Trucks Up to 4000 lbs. Capacity.*
5	*Works' Runabouts Up to 3000 lbs. Capacity.*
6	*Transporters Up to 4000 lbs. Capacity.*

MATLING FLOOR CLEANING EQUIPMENT—
details are available on request

SEND FOR FULL DETAILS TO:—

Matling LTD ***MATERIALS HANDLING TRUCKS FOR ALL INDUSTRIAL PURPOSES***

Head Office & Works: ***PARK LANE, FALLINGS PARK, WOLVERHAMPTON. Telephone WOLVERHAMPTON 31295***
London Office, Showrooms & Export: ***26/28 CAXTON STREET, WESTMINSTER, S.W.1. Telephone ABBEY 6652***

Presented with pride!

Seal your pack with " Viskrings " and establish confidence between you and your consumer. YOU can be confident that your bottling will reach the consumer perfect and intact. The CONSUMER will be confident that the contents are genuine and as expected—a fine product, perfectly presented. Seal all stoppered and screw-capped bottles with " Viskrings ". There is a " Viskring " to fit every bottle neck, available in a wide range of colours. " Viskrings " can be printed with your brand symbol. Send your container complete with primary closure to us for fitting. We will return it with samples and quotations for any quantity.

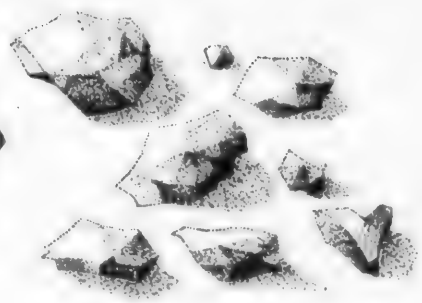
- " Viskrings " can be applied rapidly by hand—no machinery is necessary.
- They are self-adjusting.
- They prevent the blowing or riding of stoppers.
- They prevent the movement of screw caps once they are tightened.
- They afford protection for branded products and reduce pilferage and evaporation.
- CELLULOSE CLOSURES . . . Contain No Metal . . . Require No Adhesive.

for your Sales sake fit "Viskrings"

THE VISCOSE DEVELOPMENT COMPANY LIMITED

40 Chancery Lane, London, W.C.2 **Telephone: CHAncery 8111** **Telegrams: Viskap, Westcent, London** VC/4

Demand for Epikote Resins*



Demanded this-

New plant for production of Epikote Resins is the latest addition to Shell's Stanlow installation.

Rapid growth in the demand for Epikote Resins from the paint, plastics, electronics and associated industries (and from the end-users of their products) made this home production centre essential. Hitherto imported from Shell's plant in Holland, Epikote Resins are now available in ample supplies to meet the growing demand from industrial Britain.

* *Epikote Resins are the outstanding new synthetic resins which have brought a unique combination of toughness, flexibility, adhesion and chemical resistance to surface coatings; these and other important properties also give them special advantages in the manufacture of printed circuits, castings, laminates and other applications.*

SHELL **Shell Chemical Company Limited,** 105,109 Strand, London, W.C.2. *Tel: TEMple Bar 4455*

'EPIKOTE' is a Registered Trade Mark

BRITISH ROAD SERVICES

BRITISH ROAD SERVICES LTD • B.R.S. (PARCELS) LTD • B.R.S. (CONTRACTS) LTD • B.R.S. (PICKFORDS) LTD

Dependability To an increasing extent, efficient, dependable communications are becoming the first necessity of twentieth century industry.

British Road Services know how to give industry the right service, the service that provides something more than good transport : co-operation, confidence, customer satisfaction—whatever the job. Yet the rates charged are competitive and reasonable. Wherever your business may be, and whether the service required be General Haulage, Parcels/Smalls Collections and Deliveries, the supply of vehicles on Contract or the provision of special vehicles for Household Removals, Indivisible Loads or Liquids in Bulk, British Road Services are ready to discuss your requirements.

If you are not already a customer, write or telephone the Divisional Manager for your part of the country, who will be happy to put you in touch with your nearest service point.

DIVISIONAL ADDRESSES

SOUTH EASTERN

(*London, Home Counties, Norfolk, Suffolk, Hampshire, Dorset*)
Carlow Street, London, N.W.1.

TELEPHONE : Euston 7030

SCOTTISH

(*All Scotland*)
11 Bothwell Street, Glasgow, C.2.

TELEPHONE : City 7011

NORTH WESTERN

(*Cumberland, Westmorland, Lancashire, Cheshire, North Wales*)
Commercial Chambers, 47 Corporation Street, Manchester, 4.

TELEPHONE : Deansgate 7561

NORTH EASTERN

(*Northumberland, Durham, Yorkshire, North Nottinghamshire, Lincolnshire*)
20 22 St. Paul's Street, Leeds 2.

TELEPHONE : Leeds 31771

MIDLAND

(*Derbyshire, South Nottinghamshire, Staffordshire, Warwickshire, Leicestershire, Northamptonshire, Cambridgeshire, Bedfordshire*)
30 Harborne Road, Edgbaston, Birmingham 15.

TELEPHONE : Edgbaston 3841

WESTERN

(*Mid and South Wales, Shropshire, Herefordshire, Gloucestershire, Oxfordshire, Berkshire, Wiltshire and the West Country*)
Andrews Arcade, Queen Street, Cardiff.

TELEPHONE : Cardiff 23121

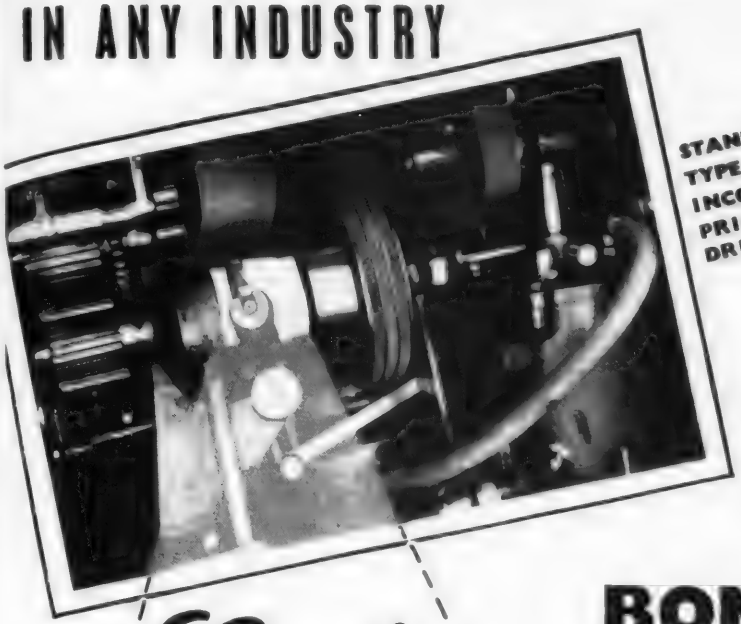
PICKFORDS

(*Specialised Services throughout the British Isles*)
205 High Holborn, London, W.C.1.

TELEPHONE : Holborn 8021

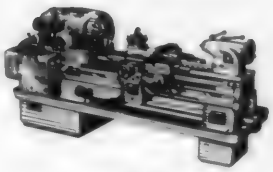
BRITISH ROAD SERVICES

IN ANY INDUSTRY

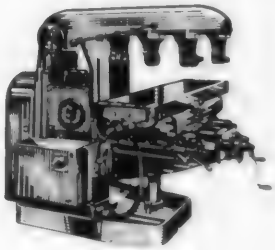


STANDARD BOM-L TYPE CLUTCH INCORPORATED IN PRINTING MACHINE DRIVE

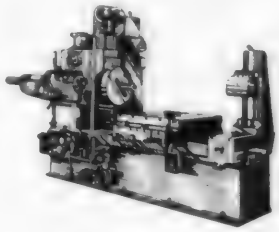
TYPICAL APPLICATIONS



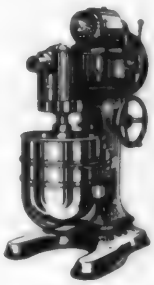
Centre Lathe



Milling Machine



Boring & Turning Mill



Food Processing Machine

Crofts

BOM-L
MULTIPLE-DISC
CLUTCHES

COMPLETE THE PICTURE

Many thousands incorporated in Machine Tools, Machinery & Drives of all types.

No levers or pins.
Never need adjustment.
Mechanisms available from stock.

Quantity produced to highest precision limits.

For details see Pub. No. 5518/14
Fill in, or attach letterhead, and post for your copy NOW!

NAME .....

ADDRESS .....

.....

Crofts (ENGINEERS) LIMITED. BRADFORD 3. ENGLAND

181

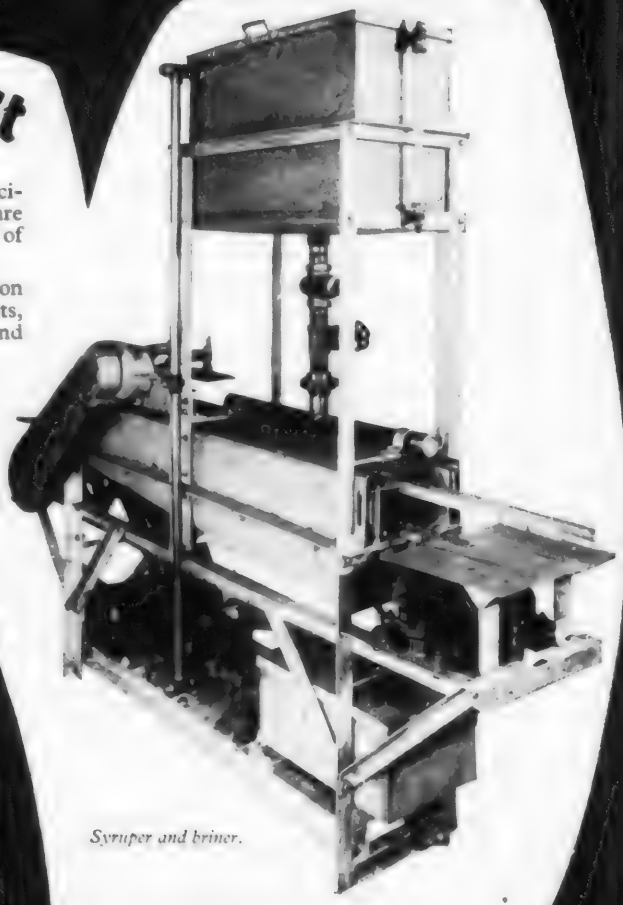
PHONE 65251 (15 LINES) GRAMS "CROFTERS BRADFORD"

Let G.C. handle it

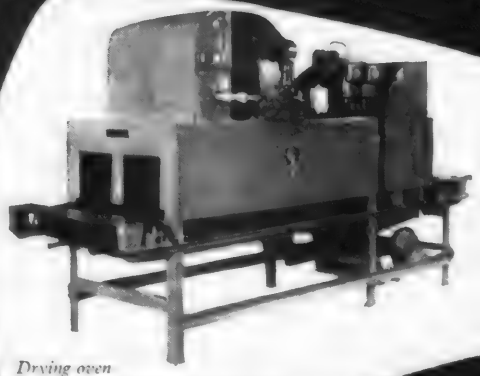
Increased production is dependent upon the efficiency of your mechanical handling equipment. We are specialists in the design and manufacture of plant of all kinds for the Food Industry.

Our products include can-handling plant, friction and bar elevators, cable conveyors, ovens, retorts, coolers, washers, blanchers, exhausters, graders and gooseneck elevators.

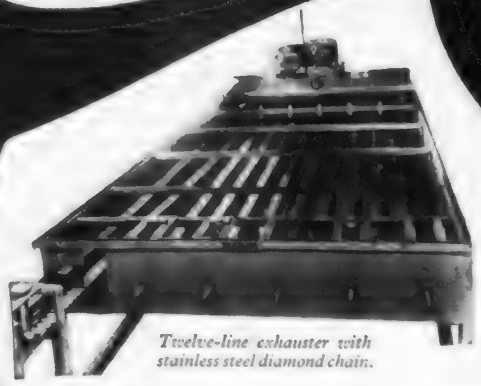
Consult us on your particular requirements.



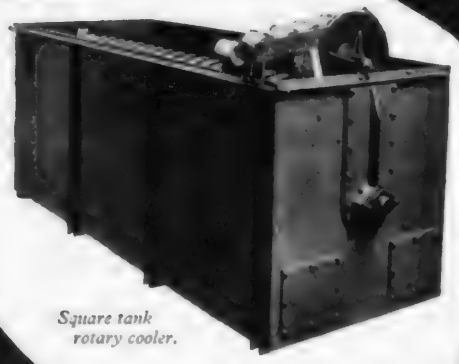
Syruper and briner.



Drying oven as supplied to Dewey & Almy Ltd.



Twelve-line exhauster with stainless steel diamond chain.



Square tank rotary cooler.

BRABY

FREDERICK BRABY & CO., LTD.

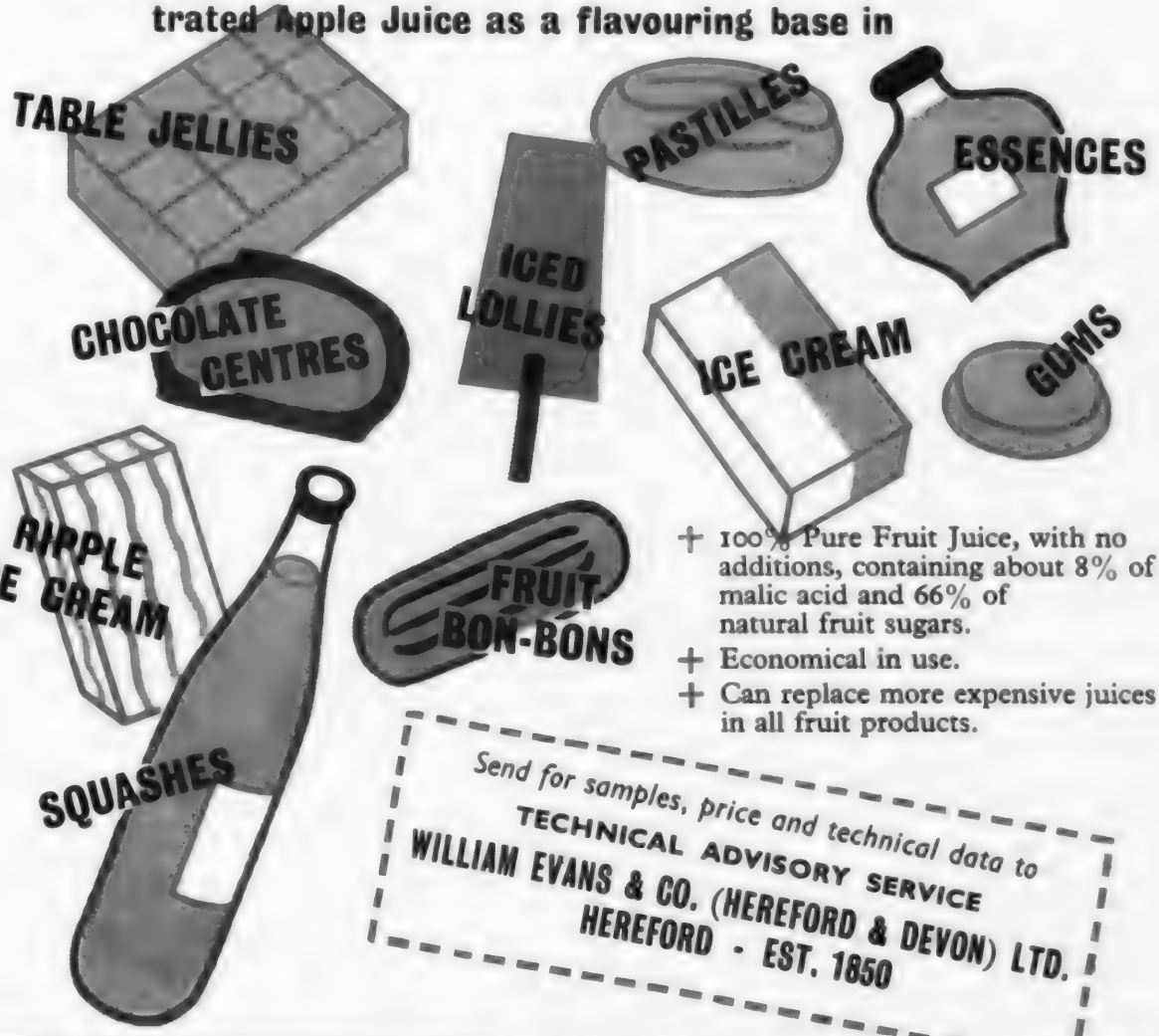
G. C. Engineering Division

London Works, Thames Road, Crayford, Kent *Telephone: Bexleyheath 7777*

(Successors to the G. C. Engineering Co. Ltd., Deptford, S.E.8.)

The most economical and finest natural fruit base — natural fruit juice which accentuates the fullness of true fruit flavours, and gives "body" to all synthetics, in all fruit products.

Confectioners and food manufacturers are now using increasing quantities of Concentrated Apple Juice as a flavouring base in



+ 100% Pure Fruit Juice, with no additions, containing about 8% of malic acid and 66% of natural fruit sugars.
+ Economical in use.
+ Can replace more expensive juices in all fruit products.

Send for samples, price and technical data to
TECHNICAL ADVISORY SERVICE
WILLIAM EVANS & CO. (HEREFORD & DEVON) LTD.
HEREFORD · EST. 1850

Makers of world renowned **ELPEX APPLE PECTIN**

BOWATERS PACKAGIN

Drums across the Sea

Toppers and television equipment are equally at home in fibre drums. To the ever-lengthening list of valuable goods that get about the world in these tough, versatile containers must now be added radar equipment. For the Royal Navy, a Bowater drum is fitted with a polythene liner and the delicate cathode ray tube is packed in a resilient nest of moulded wood wool. The result is a pack that will weather the cruellest of cruel seas. (N.B.—Bowaters welcome inquiries from other Services, not to mention civilians.)

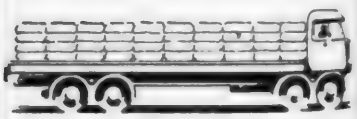
Variety Show

There's never a dull moment in the packaging business. As fast as one problem is solved another pops up. Within the Bowater range of packa products are a variety of answers to a multitude of problems. Solving problems is the spice of life for Bow packaging men. In these pages you can see just a few examples of this lively spirit in action.

Conquest of Space

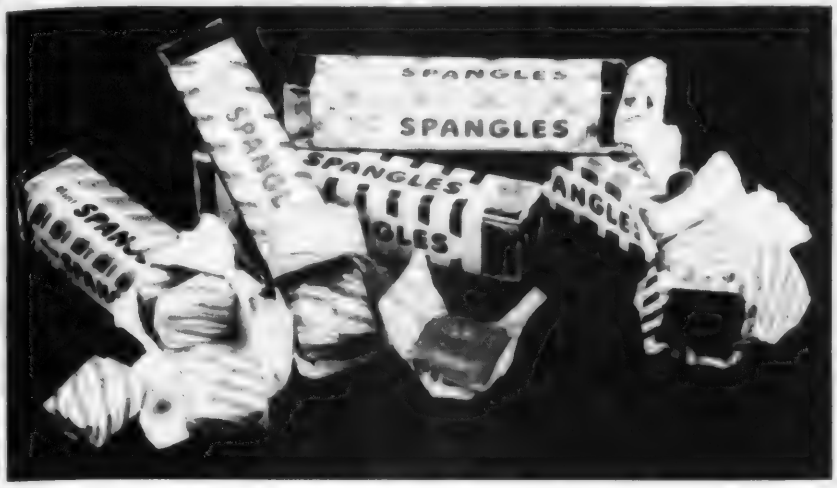
High in the list of economies effect by Bowaters' multiwall sacks is econo of space. Empty, the sacks store nea in their thousands, taking up the abs lute minimum of storage area. Full, th stack close and tight, using to the utmo the space available on the lorry, in th railway wagon or the ship's hold. An the protection they give may be vari by changing the number and type plies (walls) according to the nature the product to be carried and the trans risks it runs.

For an ever-increasing numbe of commodities — from sugar t cement, with a host of othe



powders, granules and crystals between — Bowaters multiwa sacks provide economical bu packaging.

BULLETIN



SWEET ANSWER

Two things are important to a unit pack for sweets. It must, of course, give the right kind of protection. But it must also be easy to undo. The five popular 'Spangles' lines made by Mars Ltd., are a good example. For fullest protection each sweet is separately wrapped. But it's also easy to undo. How? Bowaters provided the answer—in wax. Not only do waxed wrappers meet both these essential requirements of sweet unit wraps, they also provide a perfect surface for the gay, colourful printing which is such a distinctive feature of 'Spangles'.

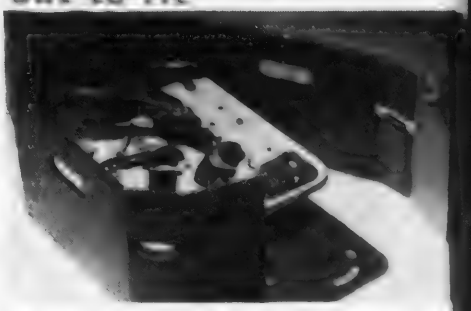
Protective waxed wrappings may well be the answer to your problem. Bowaters will be glad to advise.

Bags of Bags

The once-humble 'paper' bag appears these days in so many different forms, protecting so many different products, that it deserves a catalogue all to itself. In materials, shapes, sizes and uses, the variety is overwhelming.

Mile after mile of bags of all kinds roll off the Bowater machines every day. Many go to manufacturers for use in pre-packaging while, for retailers, Bowaters make every conceivable kind of bag, from the greengrocer's 'quart' to the elegant, fashionable millinery bag.

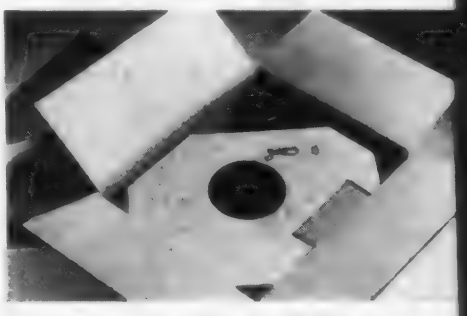
Interesting new uses for paper and other bags are constantly emerging. One of them might answer *your* packaging need.



Bowaters corrugated fibreboard cases are built round the product they have to protect.

For this Garrard record changer, for example, Bowaters designed a simple solution...

...to the problem of getting an instrument of delicate precision safely across the world.



It travels as snug as a nut, the unit being suspended in shock-proof space. Now about **your** *problem...*

Bowaters make MULTIWALL SACKS, FIBRE DRUMS, PROTECTIVE PACKAGING PAPERS, CORRUGATED CASES, PAPER AND FILM BAGS *and will be glad to discuss their applications to your business.*

Please write to:

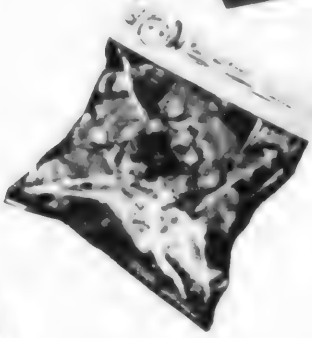
DIVISIONAL SALES MANAGER, PACKAGING DIVISION
BOWATER HOUSE, STRATTON STREET, LONDON W1 MAY 8080

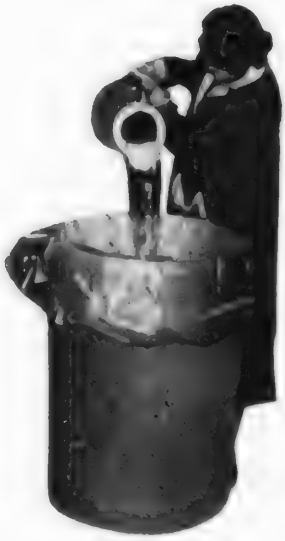
Your type of Product is Packed in

● HYPAK POLYTHENE

● Bags · Sleeves · Sheets · Drum Liners · Pouches and Specially Designed Packs

- SAUSAGE MEAT
- MEAT
- BACON
- POULTRY
- CASINGS AND OFFALS
- CEREALS
- SALT
- PULSES
- FRESH VEGETABLES
- FROZEN FOODS
- FISH
- DRIPPING
- BISCUITS AND CAKES
- FRUIT PULP
- HYGROSCOPIC POWDERS
- FOOD MACHINERY
- NUTS AND POPCORNS
- MEDICAL PREPARATIONS
- FERTILIZERS
- GLUE





REGISTERED TRADE MARK

● HYPAK BRAND

Division of

THE OPPENHEIMER CASING CO. (U.K.) LTD.

159/165 HARROW ROAD, LONDON, W.2 · TEL.: PADDINGTON 7431

SCOTTISH SALES DEPOT: THORNYBAUK, FOUNTAINBRIDGE, EDINBURGH 3 Tel.: Fountainbridge 1403

where CLEANLINESS is ESSENTIAL

you require the

POLLARD SELF-LUBE PLUMMER BLOCK OR FLANGE UNIT

Ball Bearing

Self-Aligning

Self-Sealed

Self-Lubricated

The POLLARD "SELF-LUBE" sealed bearing design offers the MAXIMUM duty, for the MINIMUM of attention and outlay.

It can be stated that 90% of bearing failures are due to the ingress of foreign matter, and by reason of the great strides which have been made in the manufacture of special lubricants, it has been possible to provide a bearing mounting requiring no servicing whatsoever.

The one piece housing and solid sleeve, enables the bearing to be fitted as a complete unit, thereby eliminating the hazards of an exposed bearing. Further, the improved sealing devices are of the flexible type bonded to a metal insert, ensuring long trouble free service and are not called upon to align themselves to the malalignment of the bearing housing.

This bearing unit gives a life equal to, or greater than, the standard open type bearing of similar size, periodically lubricated, and is available from ½" to 4" shaft diameter.

Flange units incorporating the same advantages as outlined above are also available. The drawing on left, illustrates the flange unit design.

Catalogue SL/2/55 giving further details is available on application to Room G2, Technical Sales Department.

Pollard Bearings also manufacture Ball, Roller and Thrust Bearings (Cat. BRT/1053) Transmission Equipment including Plummer Blocks (Cat. TR.27/2) Clutch Withdrawal and Water Pump Spindle Bearings (Cat. CWFP/54) Max-Load Roller Bearings (Cat. MAX/54) Solid and Flexible Roller Bearings (CAT.RFX) Automobile and Tractor Replacements (CAT. BRM/54)

POLLARD BEARINGS LTD., FERRYBRIDGE, Knottingley Yorks. Tel. Knottingley 320 (5 Lines).

London Office: 6, St. James Place, London, S.W.1. Tel. Hyde Park 9248/9.

Canadian Pollard Bearings Ltd. 1103/5 Beaver Hall Hill, Montreal.

PO/1107

Having a hand in Productivity

In every industry or trade, electrical equipment is the key to modern production methods. There are probably more production-boosting and money-saving devices than you know of. Your Electricity Board can help you and give you sound advice.

They can also make available to you, on free loan, several films on the uses of electricity in Industry — produced by the Electrical Development Association.

E.D.A. are publishing a series of books on " Electricity and Productivity ". Four titles are available at the moment; they deal with Higher Production, Lighting, Materials Handling, and Resistance Heating. The books are 8/6 each (9/- post free) and the Electricity Boards (or E.D.A. themselves) can supply you.

One man fires 12,000 dozen pieces a week

He does it electrically — in a multi-tunnel kiln. There are 16 tunnels and the ware in adjacent tunnels travels in opposite directions so that the incoming ware picks up heat from the outgoing. The ware is pushed through each tunnel in a series of predetermined steps, controlled electrically. All the operator has to do is to feed the ware into the kiln and take out the finished pieces—144,000 of them a week. Biscuit firing, glost firing or decorating, tea ware, dinner ware, tiles or 'fancies' — the electric kiln does it all. Higher output at low heating cost per article is

only one of the aids to higher Productivity that Electricity can bring you.

Electricity
a Power of Good for PRODUCTIVITY

The British Electrical Development Association
2 Savoy Hill, London, W.C.2

BUTTER—OR MARGARINE?

. . . Both are better packed in

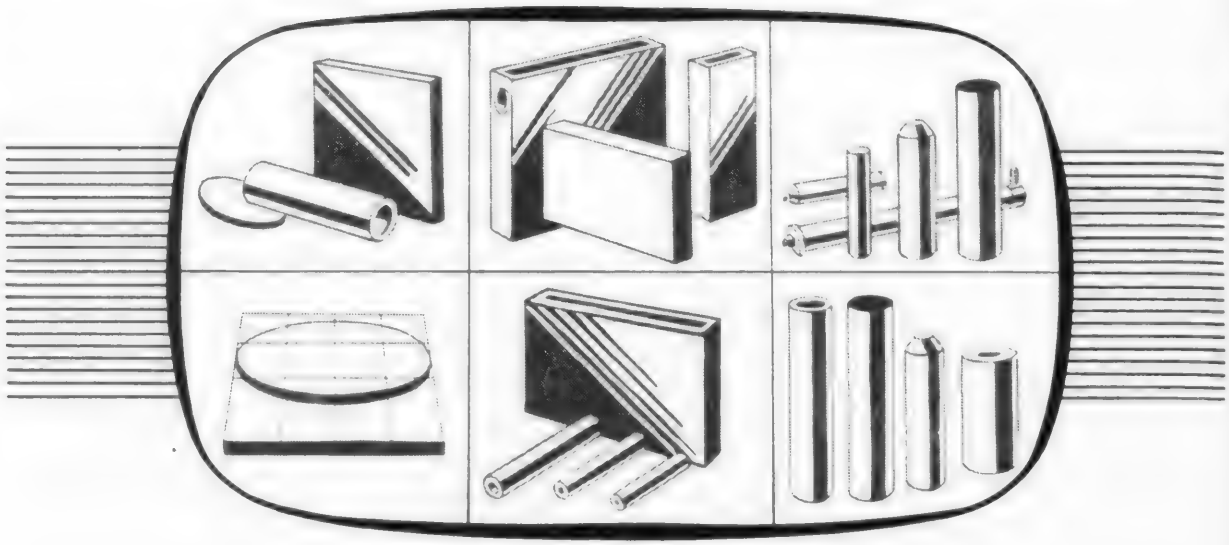
fisher's
FLAVOUR RETAINING
foils

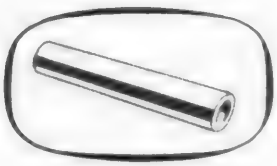
Whichever is preferred, customers will find it fresher when wrapped in Fisher's Foils. A foil, wax and vegetable parchment laminate is superior to any other material for the wrapping of Butter and Margarine; it offers complete protection from light and resultant oxidation, also from other food . . . it prevents evaporation from moisture and subsequent loss of weight and can be printed with attractive colours in Customer's individual designs, trade marks etc.

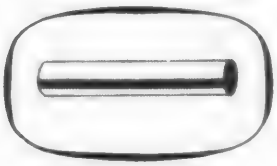
Send your enquiries for prices & samples to:
FISHER'S FOILS LIMITED · EXHIBITION GROUNDS · WEMBLEY · MIDDLESEX · Telephone: Wembley 6011

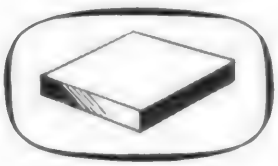
M-W.88

"Leaders in a Specialised Field"







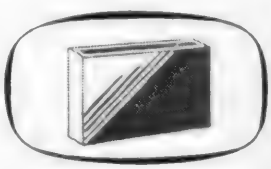


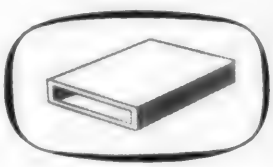
The unique position occupied by Aerox Limited in the world of industrial ceramics is due to specialisation. This company was founded essentially to manufacture and develop certain types of ceramic material to meet the needs of a growing complexity of industrial requirements.

Although classed generically as "Porsilex", "Celloton", or "CorAlith" Porous Ceramic Media, many grades of material of different types and characteristics exist to meet the vast range of uses in air, gas and liquid filtration, diffusion, aeration and electrolytic separation encountered in modern plant, CorAlith being specially developed for maximum resistance to thermal shock.

Complete Aerox Filter equipment is also available for air, gas and liquids up to pressures of 5,000 p.s.i.

* In addition, Aerox Limited are sole world selling agents for Petrox Chemical Stoneware.





AEROX LIMITED

Filter, Aerator & Diffuser Engineers & Manufacturers

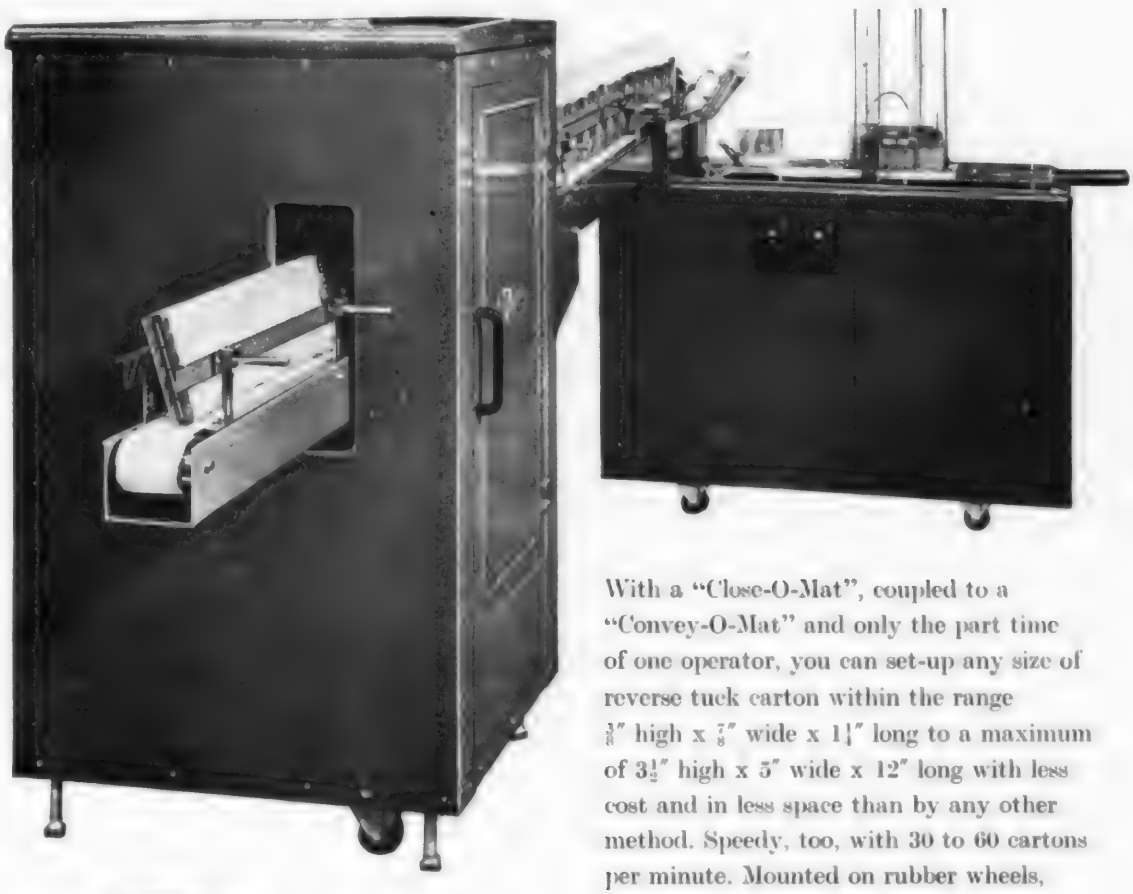
Head Office and Porous Ceramic Works: Hillington Road, Glasgow, S.W.2
Phone: Halfway 2015. Grams: "Filters" Glasgow.

Southern Office and Filter Works: Crompton Way, Crawley, Sussex.
Phone: Crawley 1277. Grams: "Aeromic" Crawley.

WHAT IT SAVES YOU IN WAGES PAYS FOR ITS COST

"CLOSE-O-MAT" and "CONVEY-O-MAT"

CARTON CLOSING MACHINES



With a "Close-O-Mat", coupled to a "Convey-O-Mat" and only the part time of one operator, you can set-up any size of reverse tuck carton within the range $\frac{3}{8}$" high x $\frac{7}{8}$" wide x $1\frac{1}{4}$" long to a maximum of $3\frac{1}{2}$" high x 5" wide x 12" long with less cost and in less space than by any other method. Speedy, too, with 30 to 60 cartons per minute. Mounted on rubber wheels, the unit is easily moved by one person. Built to the very highest standards for the very highest performance.

Peters of Slough

Manufacturers of Unscrambling Hoppers, Lidding, Labelling and other Packaging Machinery.

G. D. PETERS & CO. LTD., ENGINEERS, SLOUGH, ENGLAND. Telephone: SLOugh 23201. Telegrams: "Peters", Slough.

If it's a matter of

keeping...

HOWARDS SORBITOL is a valuable humectant that has established itself in the confectionery trade and has applications in many branches of the food industry in which sugar-like substances are used.

Sorbitol keeps the goods from drying, improves the texture and preserves freshness. Its uses range from glacé fruits (as a softening agent) to tinned fruits when delicate flavours are likely to be masked by excessive sweetness.

It is compatible with most foodstuffs, and does not react with acids, flavours or colours. Its sweetness is about two thirds that of sugar, for which it can be used as a substitute by diabetics. The preservative action is similar to that of sugar but it is less affected by biochemical contamination.

Howards supply Sorbitol in two forms

SORBITOL SYRUP 70%(N/C)
non-crystallising syrup for use as a humectant.

SORBITOL CRYSTALLINE POWDER
for use where water content has to be low.

Working samples will be sent on request and Howards will be glad to advise on their use.

HOWARDS

Sorbitol

HOWARDS OF ILFORD LIMITED, ILFORD, ESSEX

Telephone: Ilford 3333

PHYSICAL PROPERTIES

1. *Taste — cool, sweet, and with pleasant after-taste.*
2. *Solubility of Sorbitol in water (Fig. 1). Tendency to supersaturate which is often useful.*
3. *Odour—Sorbitol has no odour.*
4. *Volatility—Sorbitol is non-volatile; solutions gain or lose water according to the conditions.*
5. *Specific gravity of Sorbitol solutions at 20°C. (Fig. 2)*
6. *Viscosity of aqueous solutions of Sorbitol, glycerol and corn syrup at 25°C. (Fig. 3). The viscosity at 70% is suitable for the usual mixing operations.*
7. *At certain concentrations it has similar preservative action to sugars but is less affected by biochemical contamination.*
8. *Sorbitol is an affective humectant, water being retained over a wide range of humidity and temperature.*

FIG. 1

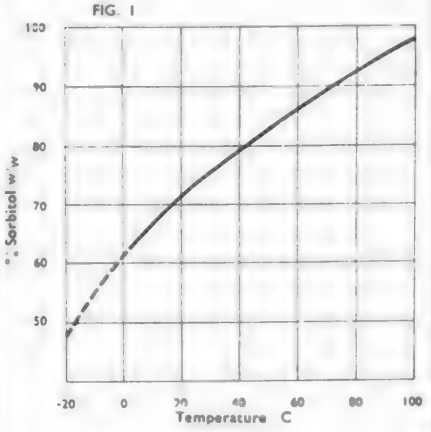


FIG. 2

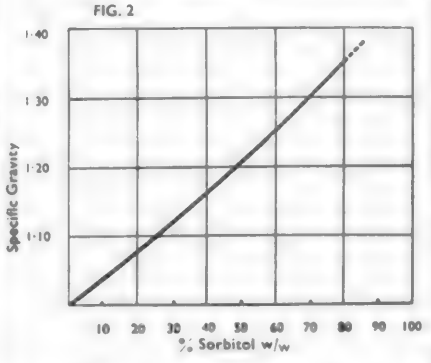
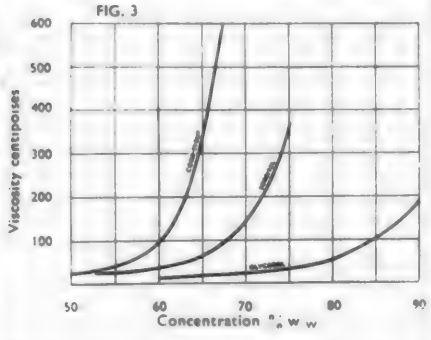
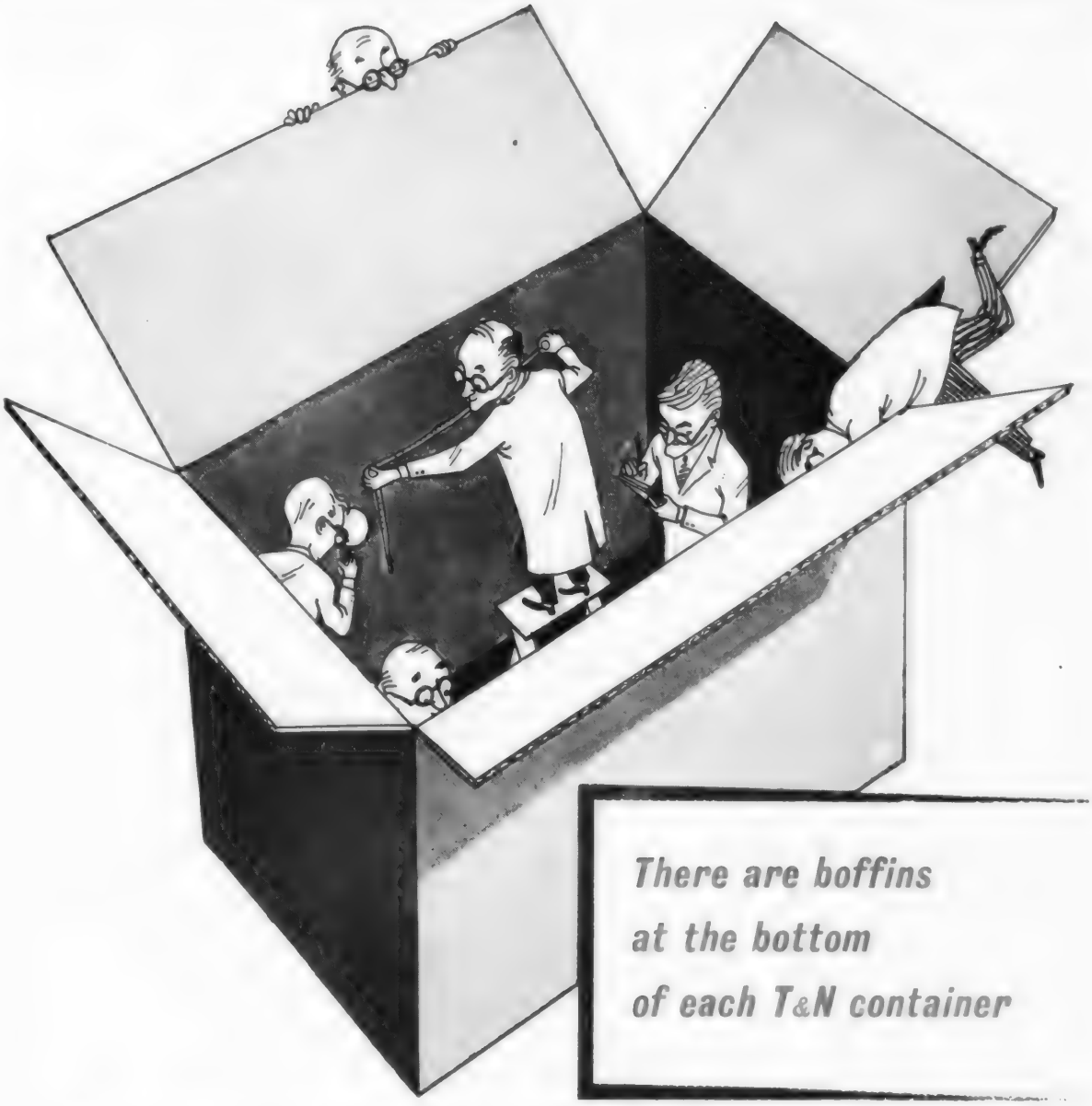


FIG. 3





There are boffins at the bottom of each T&N container

BOFFINS make a science of packaging at Thompson and Norris. You'd be surprised—you really would—at the amount of research that goes into such an apparently simple article as a T & N corrugated fibreboard container. This is because we insist upon designing each and every container to fit. It's the only real way of ensuring all-round cushioned protection.

Material is checked for weight, caliper, bursting and tensile strength, folding values and tear resistance. Finished containers are scientifically tested for fatigue and compressed to destruction to determine safe stacking weights.

T & N, the pioneers of corrugated fibreboard packaging, are still Britain's largest manufacturers. Why not let us solve your packaging problems?

DIVISION OF Reed PAPER GROUP

THOMPSON & NORRIS

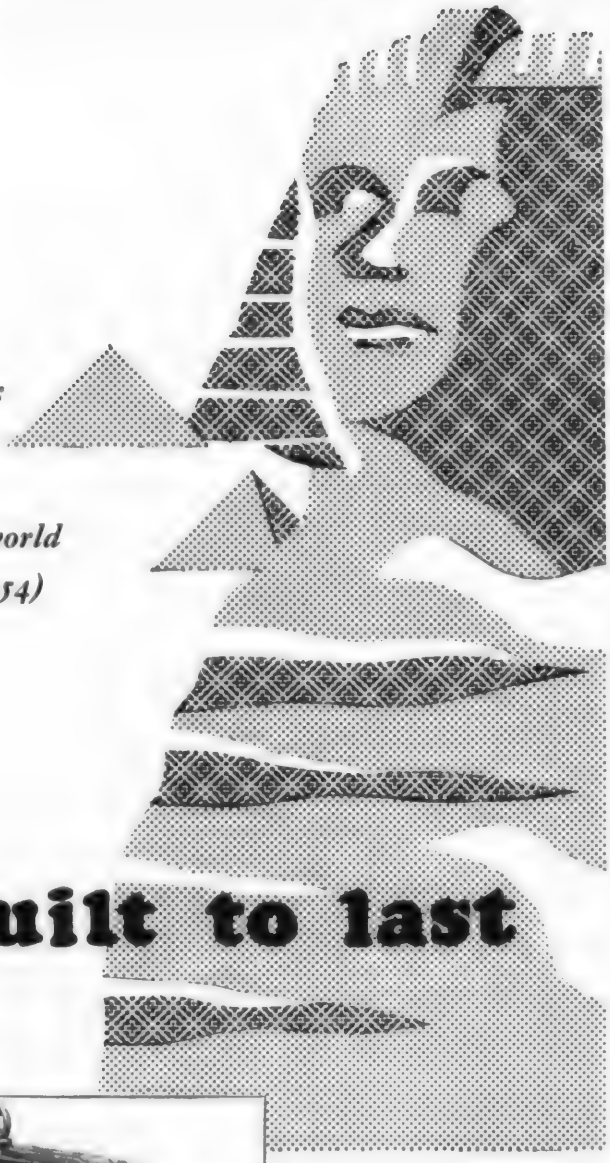
Corrugated Fibreboard Packaging

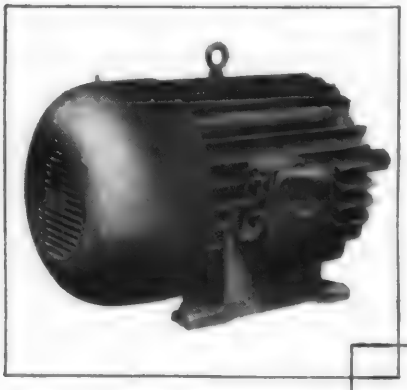
GREAT WEST ROAD, BRENTFORD, MIDDLESEX

Telephone : EALing 4555

EDINBURGH · BIRMINGHAM · HISTON · WARRENPOINT (N. IRELAND)

- *Available from stock*
- *Totally enclosed fan cooled*
- *End windings taped to give inter-phase insulation and rigidity*
- *Six leads brought out to terminal box*
- *Outputs up to 25 h.p.*
- *Double impregnation*
- *For normal duty in any part of the world*
- *Standard dimensions to B.S. 2083 (1954)*





built to last

G.E.C.

motors

Ask for Technical Description No. 431

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

PUT YOUR PRODUCT IN A TUBE . . . AND SEE SALES RISE

METAL COLLAPSIBLE TUBES
The new idea for packaging food – opens up vast opportunities for increased sales

WHY A TUBE?

It is HANDY A tube is an applicator as well as a pack. Requires no spoon or implement.

ECONOMICAL No waste. Squeeze out just as much as required.

HYGIENIC Tubes protect food against drying out and contamination.

STRONG No breakages. No danger of splinters.

LIGHT Tubes give maximum contents for minimum bulk.

LOW COST The cost of tubes is inclusive of cap, liner and printed label. Lower freight charges. No damage in transit.

And it has SALES APPEAL
Tubes have eye and palate appeal — they sell more!

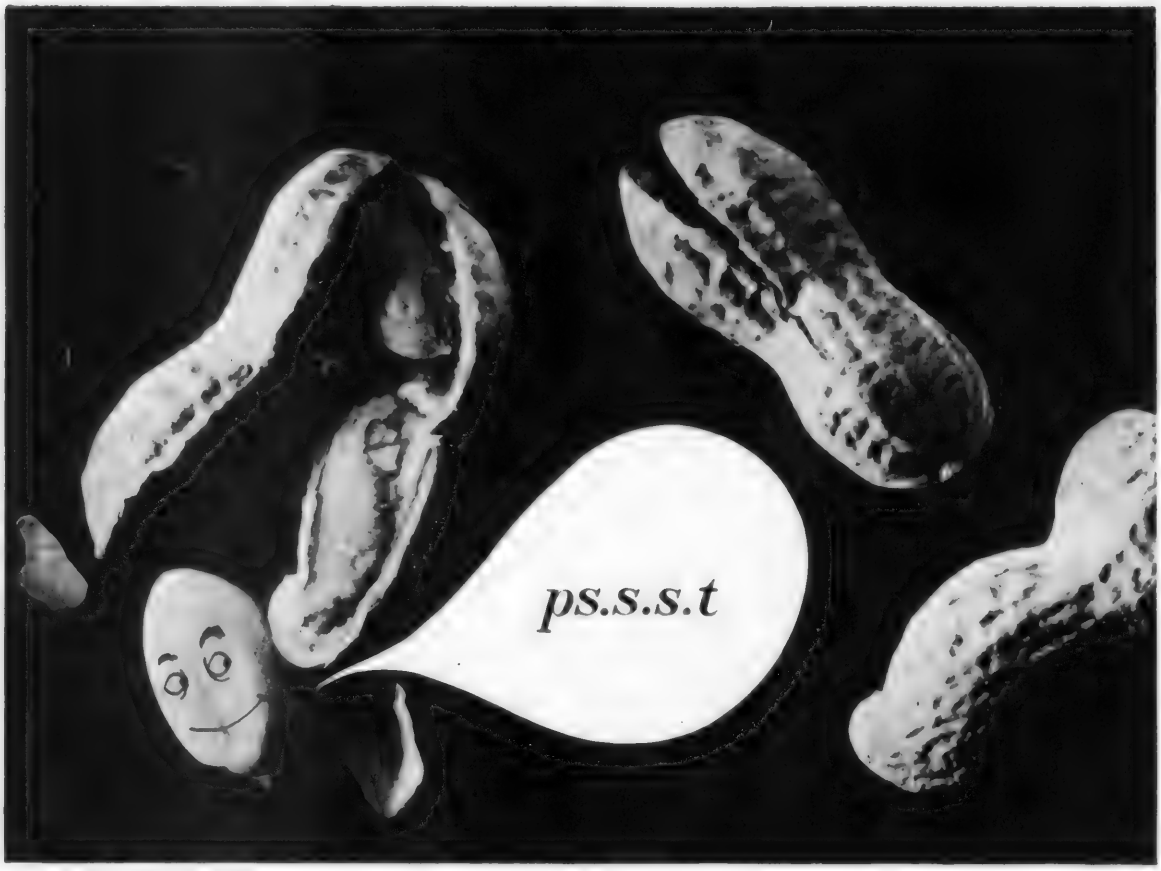
Our Technical Division is ready to co-operate on any tube-packaging project and work with you in developing it. Please write or telephone:

Hand or automatic filling according to your output. Wide range of sizes and capacities.

H. G. SANDERS & SON LTD., Gordon Road, Southall. Middx. Telephone: Southall 5611

SANDERS
OUR 110TH YEAR

for food-packaging in Tubes



My packaging problem's solved . . .
is yours?

WAXED PAPER CUPS • WAXED & FOIL WRAPPERS • COMPOSITE & METAL CONTAINERS • FROZEN FOOD PACKS METALLISED PAPER BOTTLES

Whatever your demands on design, efficiency and economy

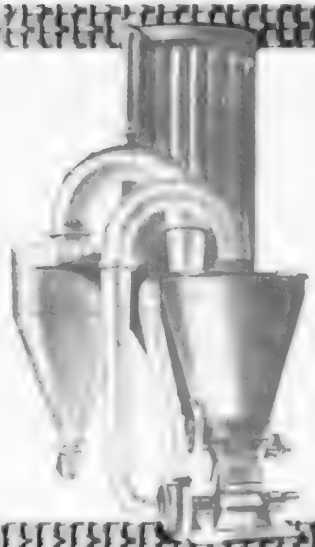
the answer is Naturally

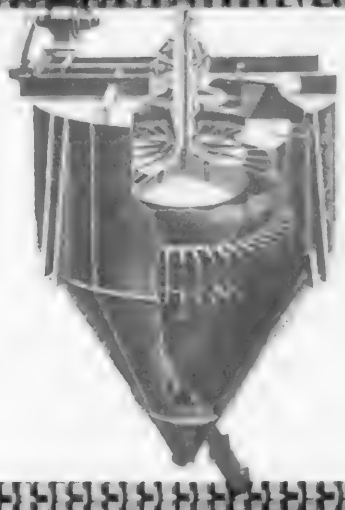
GEEMANCO

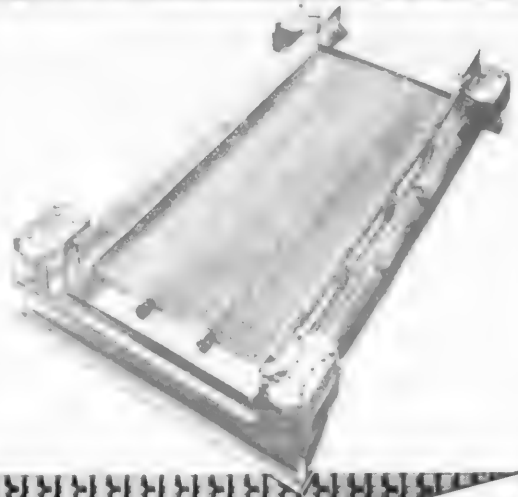
CONTAINERS

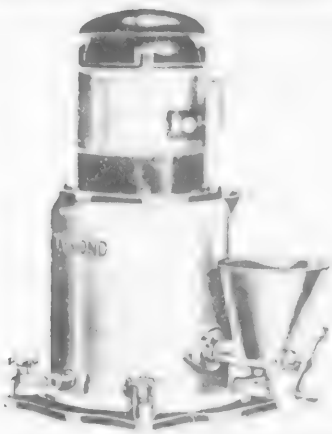
THE GEE MANUFACTURING CO. LTD., PHOENIX WORKS, FAZAKERLEY, LIVERPOOL 9

IC *experience** COUNTS









*IC key equipment is helping to improve production throughout the food industry

Here are four typical machines — the Raymond Pulveriser, Mechanical Separator, Hummer Screen and Laboratory Separator—from the IC range of processing plant. With any basic material . . . for any industry . . . you can depend on IC equipment.

ENTERPRISING ENGINEERING by
INTERNATIONAL COMBUSTION PRODUCTS LIMITED

LONDON OFFICE: NINETEEN WOBURN PLACE, W.C.1 • WORKS: DERBY, ENGLAND; PORT ELIZABETH, SOUTH AFRICA; SYDNEY, AUSTRALIA

Making full use of the fats

Answering questions "off the cuff" is an enterprising if perilous way of eking out the memory. For those of us whose schooldays are ancient history, however, it may be the fats that need to be made full use of. In which case, the subject of bread is worth a little swotting.

More and more go-ahead bakers are coming to appreciate the value of fat in bread. The addition of about 4 lb. of a high-quality white shortening to the sack of flour helps at every stage. First, the fat improves the bread dough by increasing elasticity and preventing stickiness. Then, it gives the baked loaf better symmetry, a fresh, glossy crumb and a rather more tender crust. It makes for easier slicing too, whether by you or by the customer. Finally, and most important, the shortening keeps the loaf softer longer. In short, a little fat helps to make fresher, better looking, better tasting and, of course, more nutritious loaves.

If you are interested in fats and the staff of life, we at CBC have a staff of lively experts who will be delighted to advise you. Margarines and shortenings of all kinds are our special subject. We have been manufacturing them without a break now for a very long time, and the sum total of our experience is at your service.

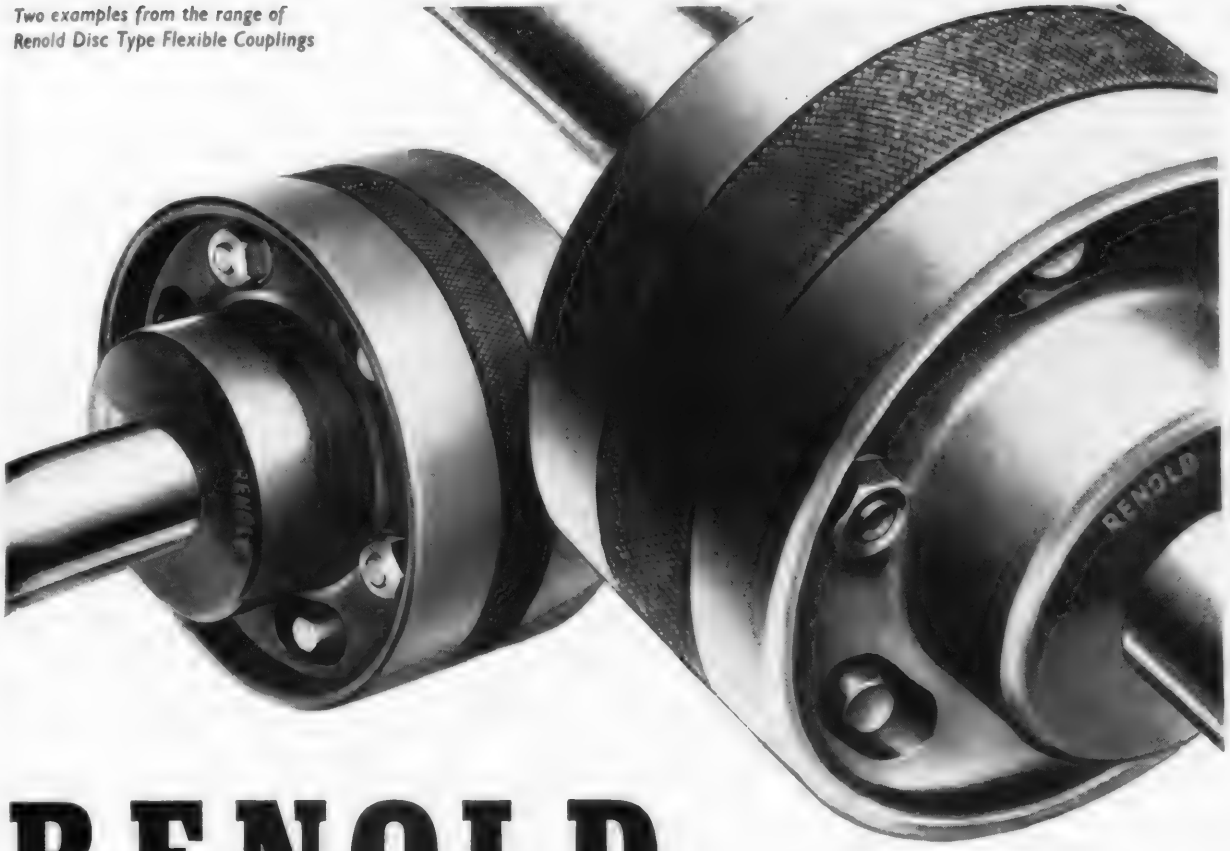
You will find our Sales Director the most capable of monitors. Just telephone or write to him, and he will give you all the advice you need to make the fullest and best possible use of the fats.

Check your fats with CBC

CRAIGMILLAR AND BRITISH CREAMERIES LIMITED
SUSSEX HOUSE, QUEEN STREET, LONDON, E.C.4. Telephone: CITy 6783

CCT 33-5-100

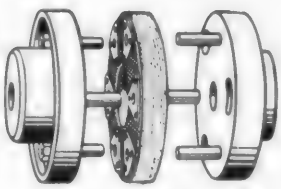
Two examples from the range of Renold Disc Type Flexible Couplings



RENOLD

Flexible Couplings — Disc Type

. . . incorporate a special flexible member built up of staggered layers of rubber-impregnated fabric of a nature suitable for dealing with vibration and shocks from impulsive loads ; they accommodate angular mal-alignment of 2° between shafts.
At the engagement points of the alloy-steel driving pins, the disc is reinforced by steel plates.
The pins are secured in the driving flanges by taper and lock-nut and the flanges are arranged for keying to the shafts.



Dismantled Coupling showing robust construction. Torque transmitted to and from disc by alloy steel pegs mounted in cast-iron flanges keyed to the shafts.

Typical transmitting capacities —AC motor speeds		
h.p.	r.p.m.	Coupling No.
10	1,450	644 263
25	1,455	644 266
70	1,465	644 269
150	975	644 273
425	730	644 280

Available in 16 sizes —maximum 600 h.p.

OTHER RENOLD STOCK SERIES COUPLINGS
SPIDER TYPE FLEXIBLE COUPLINGS
CHAIN COUPLINGS
Write for details of complete range.

AVAILABLE FROM STOCK

RENOLD CHAINS LIMITED · MANCHESTER

Transmission and Conveying Chains, Wheels and Accessories for all mechanical purposes

In a fix about a **mix?**

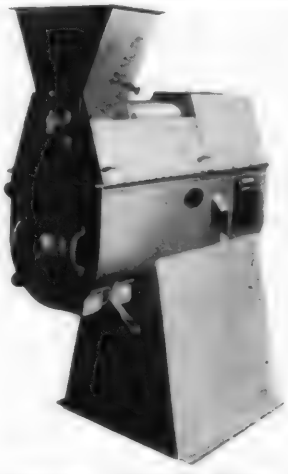
talk to **GARDNERS** of Gloucester

IF you've a mixing problem on your mind, why not talk to Gardners of Gloucester ? Whether it's a wet mix or a dry one, fine or coarse, whether you want to dry the materials as you mix or add flavouring or perfume at the same time, Gardners can supply the right machine. The wide range of standard machines has uses in industries ranging from food to fertilisers. And Gardners are always ready to design or modify any machine to suit your own special needs. Send along a sample for free test and confidential report.

GARDNERS *of Gloucester*

Wm. GARDNER & SONS (GLOUCESTER) LTD., BRISTOL ROAD, GLOUCESTER
(A subsidiary of the Gloucester Railway Carriage & Wagon Co. Ltd.)
Telephone : Gloucester 21261 . Telegrams & Cables : "Gardner, Gloucester"

London Office : 1 ALBEMARLE STREET, LONDON, W.1. Telephone : Grosvenor 8206



The Gardner 'Rapid' Sifter Mixer
Supplied in many sizes with wide choice of sifter screens and agitators to suit your product. Self contained all metal construction. Easy cleaning. Just one of the very wide variety of Gardner machines.

Send for the Gardner List giving details of 22 types of the very large range of sifting, mixing, drying and grinding machines.

EFFICIENCY

WITH B.E.V. HIGH LIFT FORK TRUCKS

Specifically designed for use where low entrances or awkward corners have to be negotiated, the RHII High Lift Fork Truck solves the problem of efficient high storage in restricted areas of operation. Capable of transporting loads up to 1,500 lbs. and turning on an outside radius of 4 ft. x 11½ ins. — the 4 wheel chassis provides added stability even with high or bulky loads — the RHII is widely used by a diverse number of industries, both at home and overseas. A wide range of attachments for special duties is also available.

ELEVATING PLATFORM TRUCKS

To carry stillages of processed parts between departments often in and out of impossible places.

HIGH LIFT FORK TRUCKS

For full utilisation of storage space.

FIXED PLATFORM TRUCKS

For heavy duty and dock service. Many hundreds are in use in principal ports throughout the world.

LOCOMOTIVES

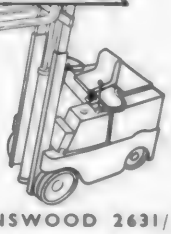
For Mines, Quarries, and Public Works projects.

ECONOMY

TYPE: RH II
CAPACITY 1000 to 1500 lbs.

Our Engineers will be pleased to discuss with you how B.E.V. Electric Vehicles can solve your storage and handling problems.

B.E.V.



WINGROVE & ROGERS LIMITED

ACORNFIELD ROAD, KIRKBY INDUSTRIAL ESTATE, *Near* LIVERPOOL · *Telephone:* SIMONSWOOD 2631/2
and BROADWAY COURT, BROADWAY, LONDON, S.W.1 · *Telephone:* ABBEY 2272

WR.6

Liquid process control by **MEASUREMENT**

1½" S 7. stainless steel meter with screw on flanges and 12" vertical index.

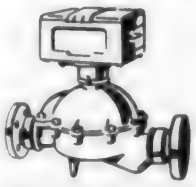
When you require to measure bulk or batch quantities of edible liquids, oils, spirits and solvents, hot or cold water, we can supply meters with summating, resettable, electrical presettable, direct reading or pointer type index attachments (as illustrated) and control equipment.

MEASUREMENT

INDUSTRIAL **LIQUID** *METERS*

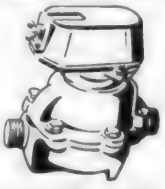
(A COMPANY OF THE PARKINSON & COWAN GROUP)

MEASUREMENT LTD. HYDRAULICS DIVISION
119 Union Street, Oldham, Lancs. Telephone: Main 6432.
LONDON: TERMINAL HOUSE, Grosvenor Gardens, London, S.W.1.
Telephone: SLOane: 0111.

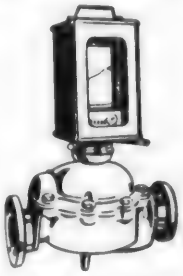


BOX TYPE COUNTER
Resettable batch-dispensing counter with 7-digit cumulative total register.

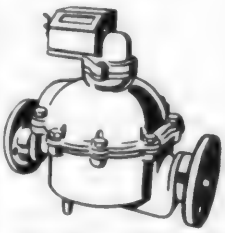
6" VERTICAL RE-SETTING INDEX
Can also be used to pre-set a determined quantity, with electric trip to operate solenoids, pumps, warnings, etc.



ZEROSET INDEX
Simple turning motion re-sets indicator to zero.

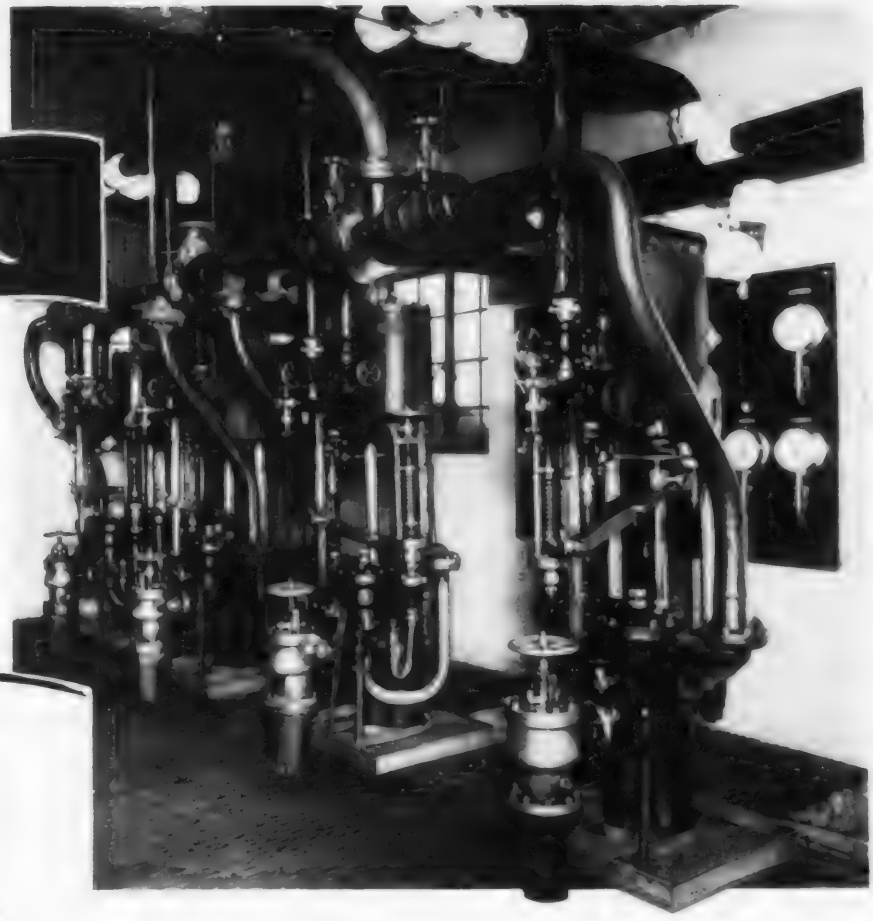


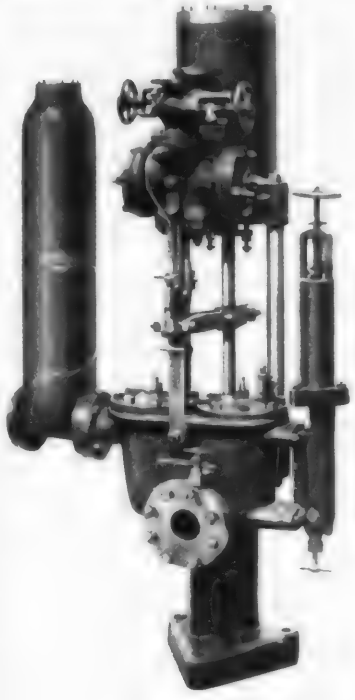
MECHANICAL RECORDER
Gives a graphic record on 5" x 12" chart; suitable for 4 hour, 8 hour, 1 day, 7 day periods.



PREDEX CONTROLLER
Automatic means for continuous dispensing of fixed quantities of liquids.

WEIR

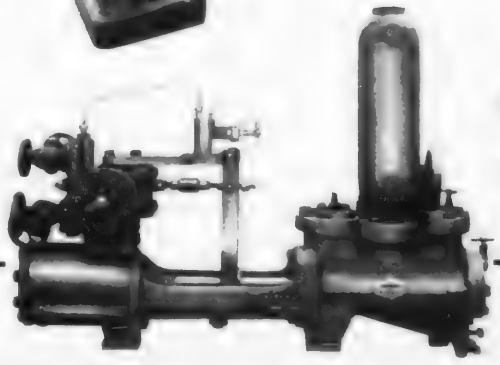




OIL FUEL PRESSURE PUMPS

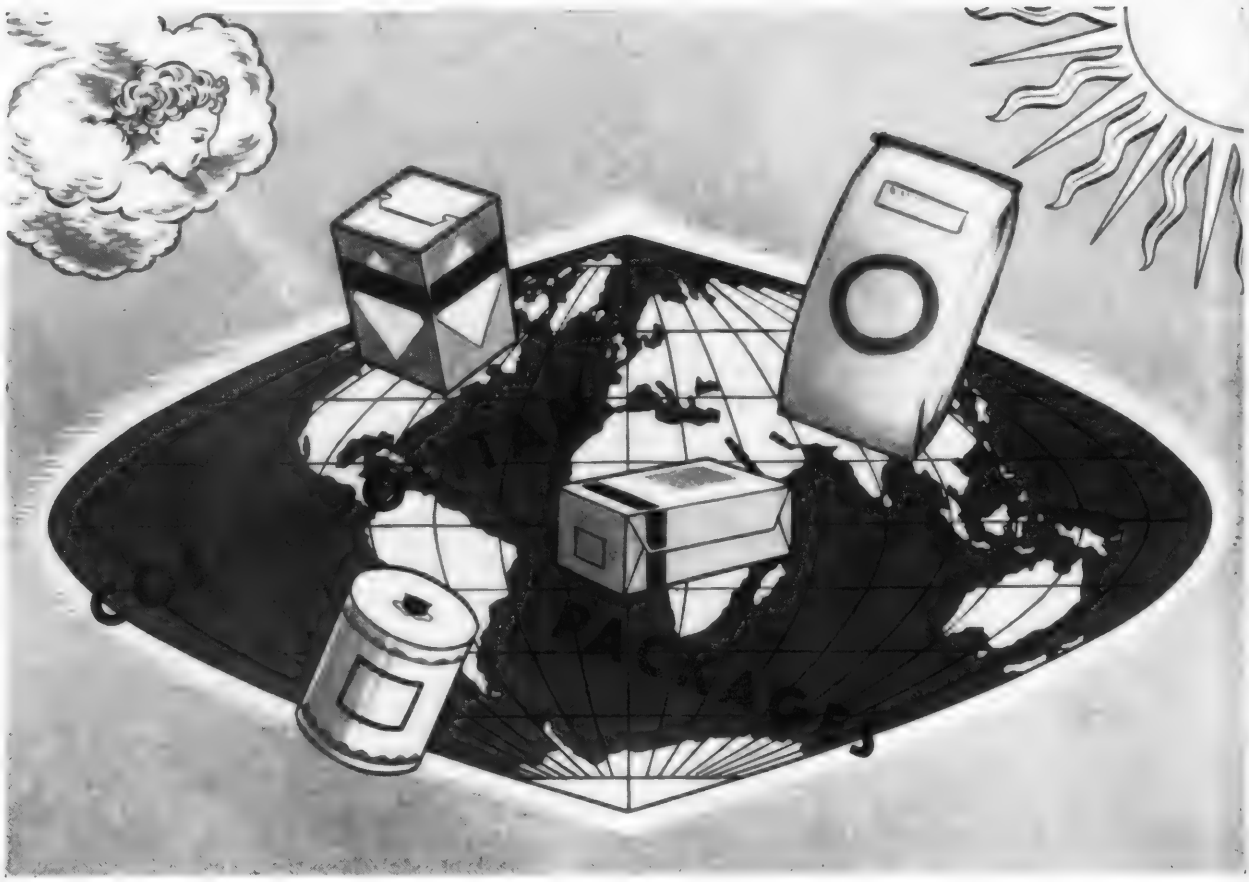
are made in vertical and horizontal designs with single steam cylinder and double-acting oil end, and are specially suitable for pumping the heaviest and most viscous qualities of fuel oil. The Weir Piston Valve Chest ensures certainty of action and economical working. Weir Oil Fuel Pressure and Transfer Pumps and Forced Lubrication Pumps are supplied in standard sizes and capacities.

Write for Publication No. ID.38.



G. & J. WEIR LTD.
CATHCART : GLASGOW

Makers of:
FEED PUMPS · FEED HEATERS · FEED REGULATORS
EVAPORATING & DISTILLING PLANTS · DE-AERATORS
AIR COMPRESSORS · REFRIGERATING MACHINERY



travel safely on the trade routes of the world

TELCON

One of the most revolutionary advances in protective packaging today is *TELCOTHENE — the thermoplastic pioneered by the Telcon organisation. Applied as a continuous coating to paper and board, it gives to these materials a new and tougher resistance to the varying climatic changes encountered in transit. It makes all kinds of goods better and more dependable travellers, ensuring their perfect condition on arrival. TELCOTHENE is hygienic, moisture-proof, non-toxic, heat-sealable, and will not support mould growth in tropical climates. Now being produced in one of the largest plants in the country, TELCOTHENE coated paper is attracting the interest of those who engage in the manufacture, packaging and distribution of foods.

**Telcothene—Polythene processed by Telcon to provide specific characteristics.*

TELCOTHENE
Coated Paper and Board

Product of the Plastics Division of

THE TELEGRAPH CONSTRUCTION & MAINTENANCE CO. LTD

Head Office: 22 OLD BROAD STREET, LONDON, EC2 *Telephone: LONdon Wall 7104*

Enquiries to: The Plastics Division, Farnborough Works, Green Street Green, Farnborough, Kent *Telephone: Farnborough Kent 3585*

Branches at: LONDON · CARDIFF · MANCHESTER · NEWCASTLE · NOTTINGHAM · BIRMINGHAM

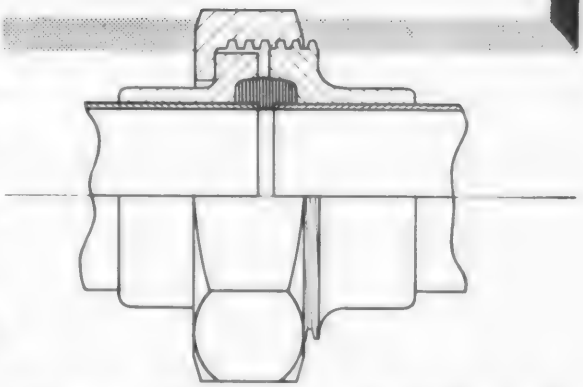
Stainless

Steel

Fittings

These CB TS type fittings represent a big step towards the perfect pipeline. They are so designed that the whole assembly is completely free of any crevice. So in-line sterilization can be done — no need to strip down the pipe systems. And if it is necessary to take down a section no tools are required because these new fittings need only to be hand tight.

The CB TS range of fittings includes unions, bends, tees, reducing bends and liners, blank caps and plug cocks. They are available in the following o.d. dimensions: 1″, 1¼″, 1½″, 2″, 2½″ and 3″.



CB/TS type fittings

CREVICE FREE AND TIGHTENED WITHOUT TOOLS

Write for full details to

TALBOT STEAD

TUBE CO. LTD · GREEN LANE · WALSALL · A TI COMPANY

MANUFACTURERS OF: SEAMLESS CARBON, ALLOY & STAINLESS STEEL TUBES · BI-METAL TUBES · METIOR PIPE FITTINGS · SANITARY PIPE FITTINGS
MACHINED PARTS & FLANGES · MANIPULATED & FABRICATED PIPEWORK
METICA METAL-CLAD CARBON OR GRAPHITE TUBES · FORJEND STAINLESS SEAMLESS WELDING FITTINGS · BRIGHT CARBON, ALLOY & STAINLESS BARS & WIRE

TBW/T84

Reigate

Brand

ESTABLISHED 1841

PURE VEGETABLE CHOCOLATE COLOUR

EXTRA CONCENTRATED

This colour is guaranteed to be entirely natural and free from any artificial or aniline dye. This is the strongest, richest and most economical preparation of its kind, and is very stable under high temperature.

Recommended for: **FONDANT, ICING, SWISS ROLLS, SPONGES, Etc.**

A Natural Product in a form which can be easily and conveniently and economically used by our customers.

We are specialists in this field and for full details of our Range of Natural Colours, write:

WHITE, TOMKINS & COURAGE, LTD

NORTH ALBERT WORKS, REIGATE

Telephone: Reigate 2242/3 *Telegrams:* ESSWHITE, REIGATE

ALUMINIUM AT WORK

From the familiar . . . . . to the less familiar

Every day millions of aluminium foil caps provide the hygienic seals on milk bottles. Aluminium foil speeds and simplifies bottling in the dairy. It gives milk complete protection against dirt and germs. And now aluminium is keeping the milk safe on its journey from farm to dairy. Aluminium churns, like the foil, leave no taste, are non-toxic, and completely hygienic. They have the strength to withstand rough handling and exposure to all kinds of weather. Yet they weigh less than half as much as the conventional type, and last years longer. In these and many other ways aluminium is setting new standards both for retail and bulk food packaging. Is aluminium helping you to keep good products at their best ?

Aluminium ingot produced by Aluminum Company of Canada Ltd., is marketed by Aluminium Union Limited. The company also exports the products of the various fabricating companies of the Aluminium Limited Group.

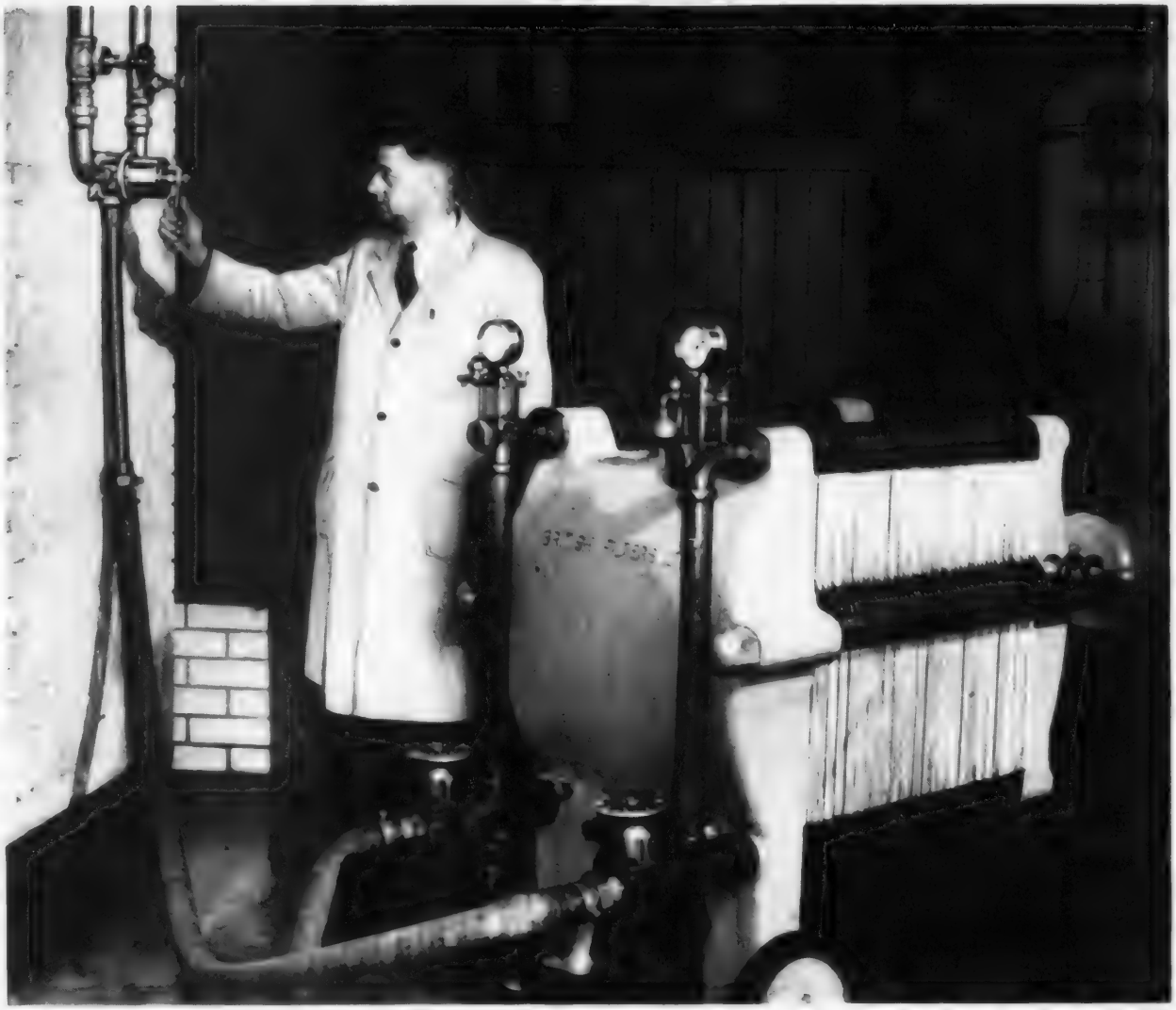
Aluminium Union Limited

(*Incorporated in Canada*)

THE ADELPHI, JOHN ADAM STREET, LONDON, W.C.2. *An ALUMINIUM LIMITED Company*

OFFICES, ASSOCIATED COMPANIES AND AGENTS THROUGHOUT THE WORLD

22



Reproduced by permission.

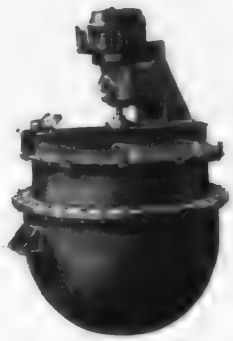
Filtering costs out of filtering

After eighty barrels of beer have gone through this filter the mats have to be changed. A costly job, as you can see from the size of the filter. To reduce the cost a brewery fitted a Leonard Thermostatic Steam Water Heater to backwash the filter beds instead of changing them. Almost at once 80 barrels went up to 120 before the mats had to be changed, and in a few months was up to 500 barrels. Costs fell from 1 7½d. a barrel to 3½d. and filter mats three grades finer than before can now be used. Everyday we save somebody something. Sometimes time, sometimes equipment, sometimes hot water. Perhaps we can do it for you. Only you can tell. Look around and ask us for details and names of users. Our pamphlet No. J/9 will tell you all you want to know.

Leonard
PATENTED

THERMOSTATIC MIXING VALVES

WALKER, CROSWELLER AND CO. LTD., CHELTENHAM



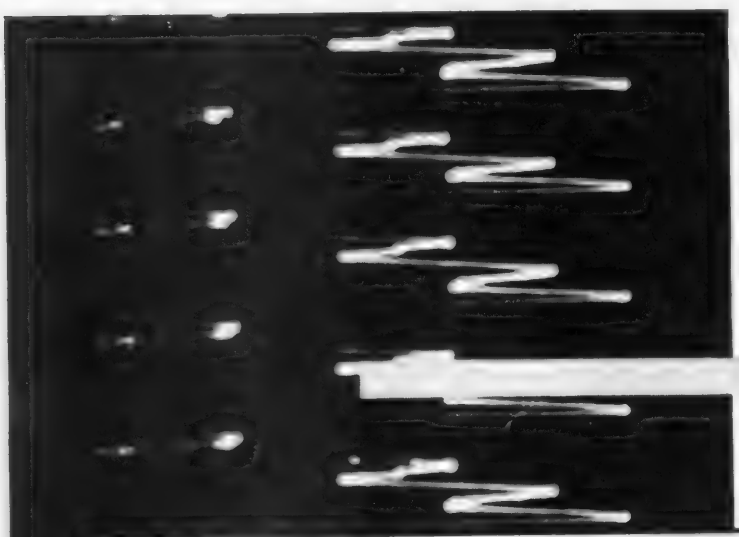
Butterfield Stainless Steel Equipment adopts the "live and let live" position without action or interference. A negative attitude but positively the best from the food manufacturing angle. For storing and processing, Butterfields work to your plant engineer's specification in producing Boiling Pans, Tanks, Tilting Pans, Jacketed Pans, Vacuum and Pressure Vessels, Troughs, Trolleys, Mixers, etc.

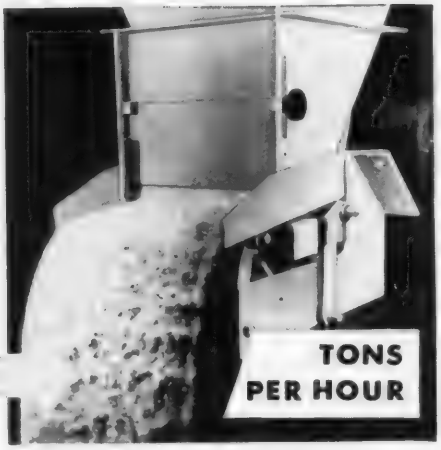
Respecting its contents

Butterfield
STAINLESS STEEL EQUIPMENT

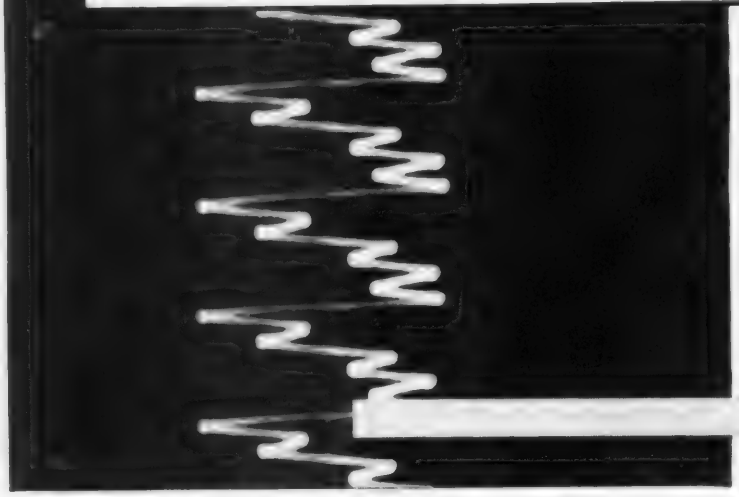
FOR STORING PROCESSING AND REFINING

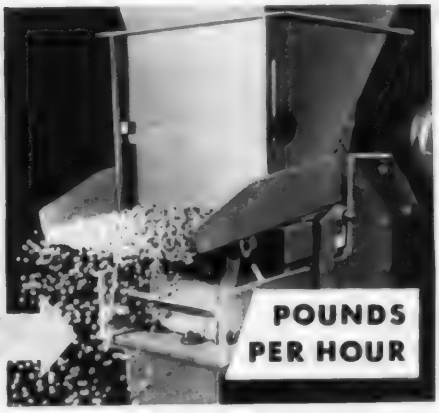
W. P. Butterfield Limited P.O. Box Shipley Yorkshire Tel 52244 (8 lines)
Branches LONDON Tel HOLborn 2455 (4 lines) BIRMINGHAM Tel EAS 0871 BRISTOL Tel 26902
LIVERPOOL Tel CENtral 0829 MANCHESTER Tel BLAckfriars 9417 NEWCASTLE-ON-TYNE Tel 23823
GLASGOW Tel CENtral 7696 BELFAST N.I. Tel 57343 DUBLIN Tel 77232





CONTROLLED VIBRATION gives the right feed rates





An oscillograph recording of the Velofeeder's vibrations at high and low feed rates. (enlarged from 35 mm.)

Wherever a regular, constant feed is required, use the Simon vibratory VELOFEEDER. It gives a controlled accuracy of feed on widely varied materials and can be be adjusted in seconds to high or low rates within a 400—1 ratio. Whatever the material — smooth, granulated or lumpy; soft, pulpy or abrasive; fine powders or 2 in. lumps — the versatile VELOFEEDER will discharge it evenly, accurately and quietly.

Materials handled include : flour, rusks, lump and granulated sugar, nuts, sweets, semolina, cocoa, salt, dog biscuits, malt products, beans, peas, starch, dextrines, etc.

Write or telephone now for Publication IPD7.

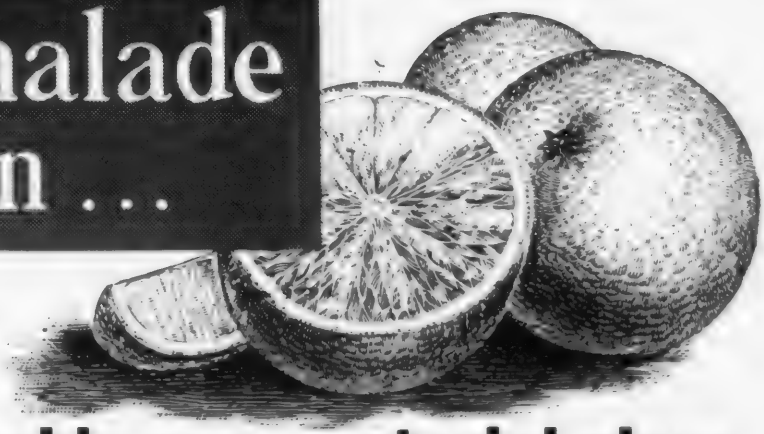
Industrial plant by **Henry Simon Ltd**

SIMON ENGINEERING GROUP

CHEADLE HEATH, STOCKPORT, Telephone Gatley 3621 (16 lines

HS 213/PS

Marmalade season . . .



Offset probable raw material rises by installing the Kellie automatic

"4 in ONE"

CUTS LABOUR COSTS BY 90%

Oranges, Lemons, Tangerines, Grape Fruits, etc., from 1¼" to 3½" diameter cut automatically into quarters, irrespective of shape. No Grading required.

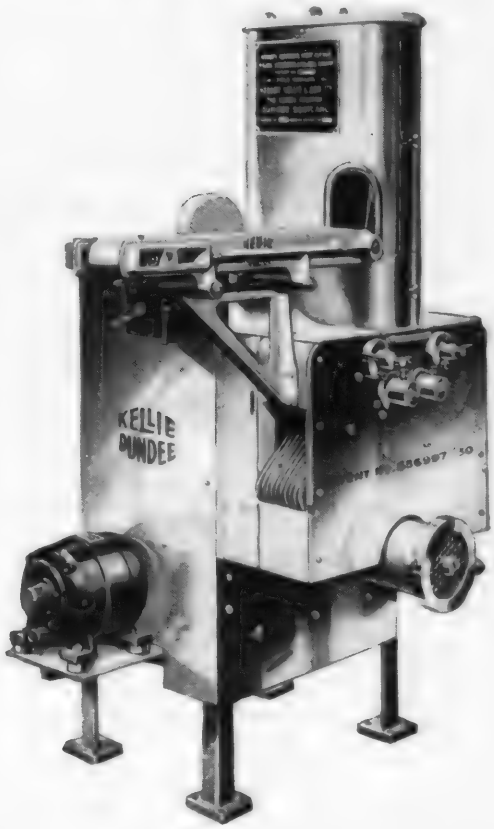
The fruit is automatically pulped, and the peel is separated to any required thickness from $\frac{1}{16}$" to ¼", ready for shredding.

Thickness of peel instantly adjustable, micrometer accuracy being guaranteed; an absolutely clean peel, or one with a small proportion of pulp is obtainable at will.

Peel, fruit pulp and juice are delivered separately at 12 lbs. per minute. The labour costs for this output SHOW A REDUCTION OF OVER 90% over handwork. This alone would enable the cost of the machine to be recovered in a few weeks.

The risk of skin disease to workers is absolutely eliminated with this machine.

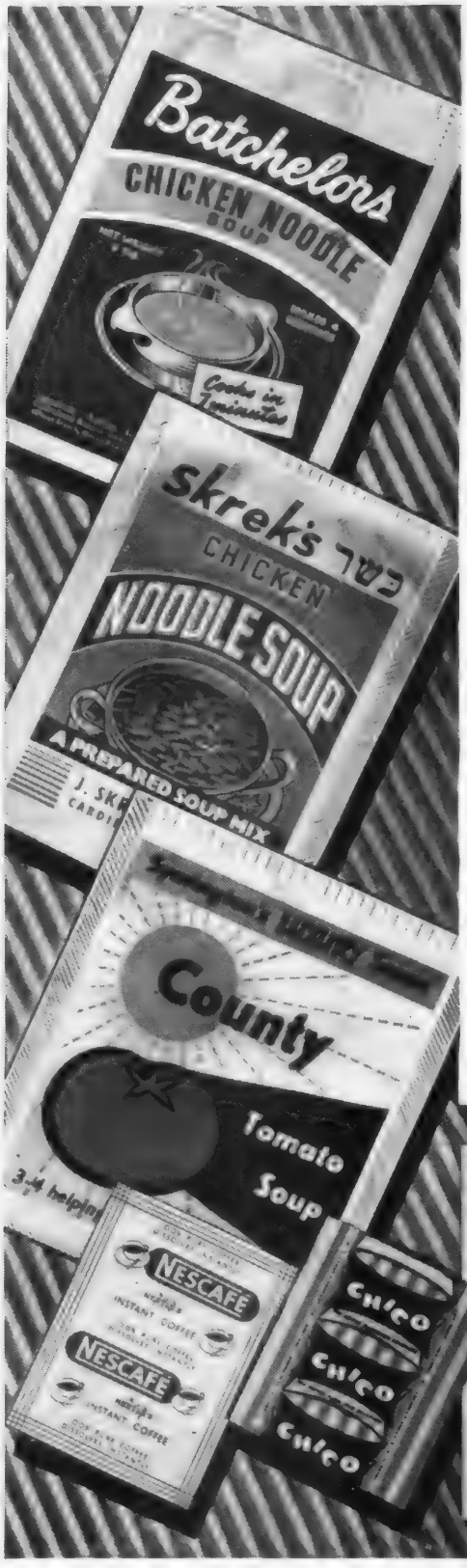
Arranged for direct coupled electric motor or belt drive with fast and loose pulleys.



This Kellie

1 QUARTERS
2 PEELS
3 SEPARATES
4 PULPS

ROBERT KELLIE & SON, LIMITED, DUNDEE, SCOTLAND



Foil and Film LAMINATIONS

New Packages that *Sell!*

Metal Box laminations have opened up completely new sales outlets for these famous makers of beverages and soups.

Made and printed by Metal Box these laminations have everything required for sales appeal, economy and long shelf life.

This is another example of the way in which Metal Box offers to industry through its complete hygienic packaging service, the resources of its design studios, its research and engineering facilities and its world-wide service of marketing intelligence.

Metal Box *know-how* does count!

LAMINATIONS give you

ADDITIONAL SALES *by providing new lines*	**SHELF LIFE** *for your product wherever it is sold*
SALES APPEAL *by attractive design*	**ECONOMY** *by high speed packaging*

THE METAL BOX COMPANY LIMITED

Flexible Packaging Division

THE LANGHAM · PORTLAND PLACE · LONDON W.1.

FP 3110

FOOD MANUFACTURE

Vol. XXX. No. 12 • Published Monthly • December 1, 1955

CONTENTS

Editorial	483
Versatile Biscuit Factory	487
Baking Research at Chorleywood	491
Recent Advances in Starch Chemistry and Manufacture—1. *By Eric F. W. Dux, Ph.D., M.Sc., A.R.I.C.*	492
Why Cooked Potatoes Blacken *By Harold G. Wager*	499
Raising the Status of Canned Vegetables	502
Bottled Mineral Waters in Italy	504
Milk, Cereals, Fermentation Processes	506
Advances in Food Technology	510
Food Science Vital for Solving Factory Problems	511
Industrial Re-rating in the Offing? *By D. Compton-James*	512
Machinery and Equipment	513
News Digest	516
Food News Overseas	523
Food Packaging	525
Trade Marks	526
New Companies	526
Information and Advice	527
Recent Patents	528
ANNUAL INDEX	529

Published by Leonard Hill Limited, Stratford House, Eden Street, London, N.W.1.
Telephone: Euston 5911—Ten lines. Cables: Inland—Lenardil, Norwest, London; Abroad—Lenardil, London

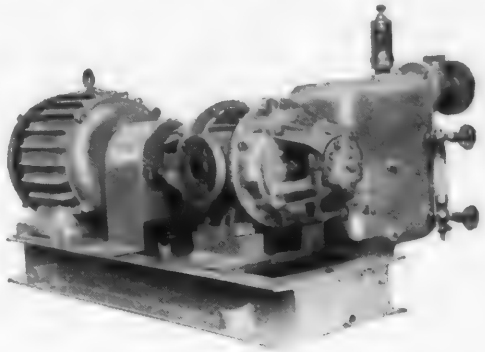
ONLY CLEAN AIR CAN REACH YOUR PRODUCT FROM THIS PUMP!

'NASH HYTOR' CLEAN AIR COMPRESSOR

Regd. Trade Mark

IT'S THE SCRUBBING ACTION OF THE LIQUID SEAL AND ENTIRE ABSENCE OF INTERNAL LUBRICATION

NO FILTERS OR AFTER COOLERS



ONE MOVING PART NO METALLIC CONTACT

British Made

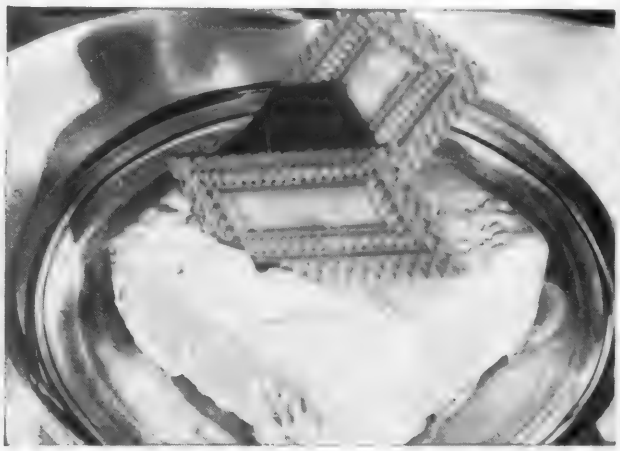
By NASH ENGINEERING CO. (Great Britain) LTD.

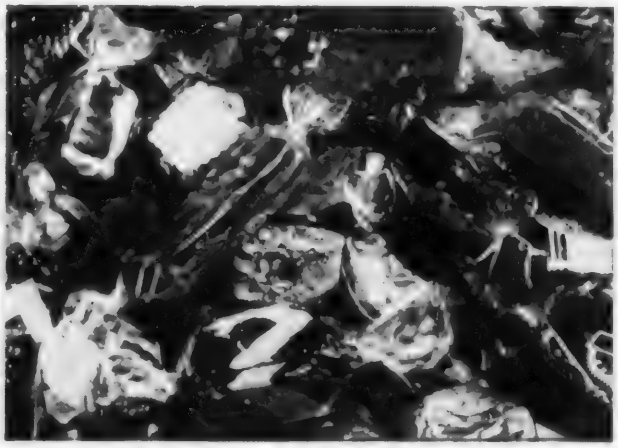
Further details with pleasure from Sole Agents and Service Engineers for BRITISH ISLES

NORMAN ENGINEERING COMPANY

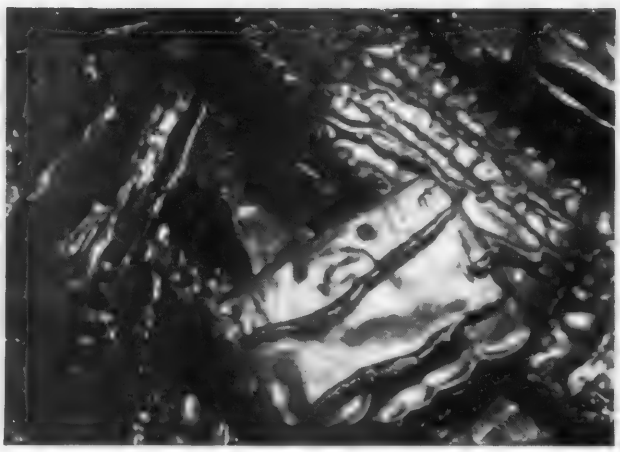
HEAD OFFICE: Hytor Works, Commerce Way, Purley Way, Croydon — Telephone: Croydon 2278-9
NORTHERN OFFICE: 273 Royal Exchange, Manchester, 2 — Telephone: Blackfriars 1033

Loders Cocos Butters





and Edible Oils



give that EXTRA Quality

LODERS & NUCOLINE LTD.

Southern Area
UNILEVER HOUSE BLACKFRIARS
LONDON E.C.4 · Tel: CENtral 6323

Northern Area
LIVERPOOL ROAD WARRINGTON
LANCS · Tel: WARRINGTON 800

Scotland and Northern Ireland
19 BLYTHSWOOD SQUARE GLASGOW
Tel: GLASGOW CENTRAL 8921 LN 13

FOOD MANUFACTURE

Vol. XXX, No. 12 December 1, 1955

Too much vitamin D?

RICKETS is a rarity today because the British infant is abundantly provided with vitamin D. Welfare cod liver oil, national and other dried milk, proprietary preparations and certain baby cereals are all available for the toddler. While nobody wants rickets to return, some authorities are doubtful of the total effect of all these preparations. Comparative studies in Salford between groups of children fed on cod liver oil with those who were not, showed little difference between the two groups, except in regard to growth and general condition, which was thought probably due to parental neglect rather than to a specific deficiency of vitamin D.

Hypovitaminosis D due to lack of cod liver oil had been suggested to the Salford Child Health Panel as responsible for the poor state of nutrition of children in their second year. To investigate the theory, a team consisting of a doctor, a dentist and a biochemist, led by Dr. W. T. C. Berry of the Ministry of Health, made the special study which has now been reported in the Monthly Bulletin of the Ministry of Health for October.

The team compared 37 children aged 1-2 years who had had little or no cod liver oil in their lives with 50 controls who had received cod liver oil regularly for the previous six months, for growth, tooth eruption, radiological appearance of the wrist and serum alkaline phosphatase. Intakes of vitamin D during the first year ranged from practically none to about 300 i.u. daily in the case of 10 children; in the remainder it was judged to have been on average about 700 i.u., mainly owing to the consumption of fortified dried milk and baby cereals. During the second year intakes fell in all cases to an estimated average of about 25 i.u. daily, compared with 450 i.u. in the controls.

Despite their low intakes, compared with "requirements" none of the study group showed evidence of hypovitaminosis D, either past or present. They were less well grown than the control group, but the team consider that this may have been due to parental neglect other than failure to give them vitamin D, for a number of them were from "problem families"; it is noteworthy that the serum phosphatase levels were no higher than those of the control group.

The team recommend fuller study of the requirements of vitamin D during the second and subsequent years of life, but point out that as regards the first year, of those who failed to avail themselves of cod liver oil, nearly three-quarters were protected by dried milk acting as a second string to the bow of preventive medicine.

The vitamin D intakes of some children would have been about 2,300 i.u. daily at the age of 6 months had they been taking cod liver oil as well as dried milk, etc., and this raises the point that children receiving similar diets plus cod liver oil may receive too much vitamin D. The minimum levels of vitamin D intake at which toxic symptoms occur has been reported to be just under 2,000 i.u. daily, and although the relation of this to hypercalcæmia is by no means certain, and whilst most children may be able to ingest large amounts of calcium and vitamin D with impunity, in a few too great a tax may be put upon their capacity for adjustment.

The implications of this study are disquieting, for they throw serious doubts upon the nutritional soundness of our elaborate, costly and much-vaunted welfare foods programme. Critics of the scheme have not been slow to recall that just over a year ago Ministry of Health experts showed that welfare orange juice, issued to supply extra vitamin C, in fact constituted merely a pleasant drink. The welfare foods scheme needs overhauling. Can it be done scientifically and objectively and free from political wrangling?

Perils of dried albumen

THE POSITION regarding dried albumen from China is causing concern to bakers. Many batches are being held up by the health authorities on the ground that small numbers of *Salmonella* spp. have been detected. Investigations on recent samples by the Albumen Advisory Committee show that because of the nature of the product, a negative bacteriological test on limited samples is not conclusive evidence that the bulk is fit for use in food unless this use is restricted to certain processes ensuring sterilisation. Some medical officers of health have been releasing albumen which on sampling shows negative results to *Salmonella*, and stipulating that it is only to be used

in goods which are subjected during manufacture to a sterilising temperature of over 212°F. for upwards of 10 min. Hence, it can be used in all baking processes and for the making of marshmallow from hot high boil syrup, macaroon paste, meringue shells and shapes.

The committee warns that the albumen must not be used for royal icing, meringue topping (even when "flashed" in the oven) whipping with fondant, cream or butter fillings, soft icings or marshmallow or for any product in which the albumen is not subjected to the sterilising temperature.

The presence of *Salmonella* in dried egg products from any source is by no means new: one remembers the large numbers of new strains of *Salmonella* introduced into this country from America with the early war-time consignments of dried egg. Numbers are usually small, and the danger arises only if they are allowed to multiply through faulty methods of food preparation.

Nevertheless, several cases of paratyphoid as well as ordinary *Salmonella* food poisoning have been attributed to the consumption of uncooked albumen in bakery products. It appears very desirable that all dried albumen, from whatever source, should be rendered "foolproof" by some effective pasteurisation treatment. Ordinary heat treatment presents difficulties owing to heat denaturation of the albumen, but experiments are now in progress with several promising methods of modified heat treatments which render the albumen *Salmonella*-free without impairing its quality. The Albumen Advisory Committee is undertaking large-scale experiments on the sterilisation of Chinese albumen crystal, and limited quantities may become available which will be suitable for royal icing and other cold process uses.

As China is by far the cheapest source of supply of this material, it is to be hoped that one of these methods will soon be given an official blessing.

Salesmanship and showmanship

"LIKE ALL other modern merchant adventurers he is an asset to the community." Thus Sir William Rootes, chairman of the Dollar Exports Council, congratulated Mr. Kenneth Horner, the young Durham sweet manufacturer who sent a van tricked out as a Tudor cottage on a 26,000 mile "showing the flag" tour in the U.S. and Canada.

Circumnavigating the earth in odd vehicles is nothing new today, but too often these journeys serve no other purpose than to gratify an eccentric whim. Mr. Horner's "Candy Showvan," which had its full share of dangers in the Rockies, in blizzards and in the remoter parts of the North American continent, was responsible for the sale of a million tins of sweets to Americans and Canadians and a 125% increase in his company's export business to North America. Mr. Horner has already earned the public congratulations of the Chancellor of the Exchequer and of the Board of Trade for his original export exploits. Sir William Rootes went on to say: "If we had a thousand people like him doing this, Mr. Butler would not have needed a second Autumn budget." A thousand Tudor cottages touring America would, we feel, alarm even the publicity-hardened Americans, but Sir William's meaning is clear. As he said: "Dollars don't grow on trees, and even if they did you can't shake them down from an office desk in Britain."

Food and the new dollar drive

THE enormous potential market represented by the dollar countries was emphasised recently when the Dollar Exports Council inaugurated a new sales drive in these areas. Sir William Rootes pointed out that these countries are currently importing no less than 18½ billion dollars' worth of goods, or in other words about £6,500 million, almost half as much again as the whole of Britain's budget. To assist exporters the Council maintains trade centres in Montreal, Toronto, Vancouver, San Francisco and New York, which are ready to give advice and help, particularly in the form of contacts, to British businessmen. In the Latin-American dollar markets leading British businessmen have been appointed to act as Trade Representatives in almost all countries.

At the same meeting at which this information was given, the Economic Secretary to the Treasury defined the government's attitude towards the expenditure of dollars on investments in North America. He said the policy is to make dollars readily available for all kinds of trading investments in Canada and the U.S. that will increase the nation's exports to that area, increase the supply of raw materials available to British interests, or promise a high yield on invested capital.

This renewed drive for dollars makes it opportune to remind the authorities that one of the greatest single stimulants to the food export trade would be an agreement on a common list of permitted food colours between this country and the United States and Canada. At present manufacturers have to use for dollar exports colours permitted by the U.S. authorities but not necessarily permissible in this country. Thus they run the risk of being unable to dispose of their goods should they, for any reason, fail to be sold in the U.S. Apart from this, technical problems in the factory would be considerably eased if an international list of permitted colours was available.

Representations on this question have been made to the Food Standards Committee on colouring matters, and their decision is still awaited.

Squeeze to serve

AN ACTRESS, Elizabeth Allen, recently held a party. This occasion, which would seem more properly reported in a society magazine, is recorded in FOOD MANUFACTURE because all the canapés and snacks provided were from foods packed in collapsible tubes. Even the cream served with the coffee was squeezed from a tube.

Miss Allen cannot claim the credit for this novel idea because the party was sponsored by the Collapsible Tube Manufacturers' Association to promote interest in foods packed in tubes. It also served to emphasise how far this market is being won by Continental food manufacturers. Of the many types of tubed foods used by Miss Allen, eight out of ten were imported. Mustard and—to a much lesser extent—liquid icing sugar are the only foods which have been regularly packed in tubes in this country, but on the Continent tubes of vegetable and fruit purée, mayonnaise, meat pastes and extracts, condensed milk, coffee concentrate, olive oil and cheese spread sell well. British importers of these foods have reported fairly steady sales. One sold about 150,000 tubes of Italian foods during last year's season and hopes to double this figure next season. Many importers are planning to expand their activities as far as the restrictions on the use of preservatives will let them. As Mr. C. Cooke, the Venesta representative on the C.T.M.A. publicity committee, remarked, the invasion of Continental foodstuffs is providing a healthy stimulus to British manufacturers, and the manufacturers of mustard in tubes report sales running into millions each year. George Mason produce a gravy browning and a Continental mustard, and are expected to introduce mayonnaise in tubes next year.

Aluminium is most commonly used in collapsible tube manufacture and is cheaper in bulk than tin. Although tin and sometimes tin-coated lead are used for some products, aluminium is invariably the metal for foods. Some foods, such as condensed milk, need no insulation from the metal surface because no chemical reaction takes place, but others are usually protected by a lining inside the tube; generally a lacquer coating of synthetic resin. Mass-produced aluminium tubes of about $\frac{7}{8}$-in. diameter would cost about 1¾d. each, and the protective lining would cost about 15% more. Larger and more complex tubes could cost as much as 9d. each, but it is unlikely that these would be required for food products.

British food manufacturers are reluctant to pack their products in tubes probably for fear of consumer resistance to "tooth-paste foods." But tubes have so many advantages for picnic foods, service rations and similar applications that their popular acceptance must only be a matter of time.

Resistance to irradiation

IRRADIATION problems were among the subjects investigated by the American Meat Institute Foundation and recorded in the Annual Report for 1953-54. The studies, which were aided by contracts from the Atomic Energy Commission and the Quartermaster Corps of the U.S. Army, were made on radiation with low dosage gamma rays on meat at temperatures near freezing and the effect of gamma irradiation on nitrogenous compounds, proteolytic enzymes, flavour, odour, pigments and fats in meat.

The group of bacteria responsible for the spoilage of irradiated meats are described for the first time by Felton *et al*, who investigated the radiation sensitivity of spoilage micro-organisms with respect to the keeping quality of meat. The spoilage of irradiated meats, first marked by a sour smell, is due to organisms which are large, non-motile, non-sporeforming, Gram-positive rods that are catalase-positive, facultative and psychrophilic. These bacteria are very resistant to radiation as compared to the pseudomonads. Their mean lethal dose is in the order of 30,000 rep under conditions where the comparable dose for the pseudomonads is about 3,000 rep. The investigators also determined the radiation resistance of some of the micrococci, lactic acid bacteria and yeasts which limit the shelf life of cured meats. Micrococci, including food poisoning staphylococci, have a mean lethal dose of about 15,000 rep. The dose for greening lactobacilli was found to be between 12,000 and 15,000 rep.

In marked contrast to the results previously reported for the pseudomonads, no appreciable difference in radio-resistance of a staphylococcus or a lactobacillus was observed for populations ranging from 3×10^5 to 3×10^8 cells per ml.

Milk marketing in New Zealand

"NEW ZEALAND'S market milk industry is organised to take cognisance of the separate identities developed by the industry in the spheres of production, treatment, distribution and control," Mr. T. P. J. Twomey, superintendent of market milk, New Zealand Department of Agriculture, told the Society of Dairy Technology in an address given at its annual general meeting recently.

Production is a function of town milk producers, registered by the Department of Agriculture, and organised into local co-operative milk supply associations. These associations contract through the New Zealand Milk Board to supply a nominated quantity of milk on each day of the year.

Treatment is undertaken by treatment stations, registered by the Department of Agriculture and in a few raw-milk bottling plants under the supervision of

the Department of Health. These treatment stations process and bottle the milk and supply it, ready for retail sale, to milk vendors who are not usually employees of the treatment stations. They bottle practically all the milk, 70% of the amount being bottled in 38 mm. aluminium capped bottles. No milk cartons are used. Some treatment stations bottle raw milk for sale as such, but most produce pasteurised bottled milk only. The cost of treatment is met by the New Zealand Milk Board through the payment of margins for processing and bottling. Some of the treatment stations are publicly owned, either by the Government or by municipalities, and some are owned by producer co-operatives and by private firms. No treatment stations are owned by consumer co-operatives. School milk and baby milk are standardised to a 3·3% butterfat content. Ordinary milk is not standardised. Dairy products are not manufactured in milk treatment stations, and all balancing is done through local dairy factories. By-products have been recently introduced though with indifferent success. With few exceptions distribution is performed by individual roundsmen each owning the goodwill in his milk round.

Quality control is exercised through the Department of Agriculture and the Department of Health. Economic control is exercised through a nationally constituted Milk Board and through local milk authorities. Consumer representation is in the majority on the Milk Board and is complete on the local milk authorities. The Board administers the national milk scheme on behalf of the Government and operates the provisions of the Milk Act. Both the Board and the local milk authorities are financed by contributions from the milk subsidy fund.

Fortification with amino-acids

THE U.S. National Research Council has passed a negative and far from encouraging verdict upon the idea of fortifying foods with synthetic amino-acids. The protein variety in the U.S. diet is regarded as adequate in peacetime. For the time being at any rate it would seem that large-scale producers of amino-acids will be left in the somewhat disappointing position of "having tried it out on the dog." The metaphor is apt, for one producer of dog-foods has been adding methionine to his product.

Methionine, produced on a fairly large scale by at least three major chemical companies, sells at under $3 per lb. in animal-feed grade. It has already developed a sizeable market as an additive to poultry feeding stuffs, and, to a rather smaller extent, pig foods. Lysine is still somewhat expensive at round about $12 per lb., but if and when production passes the semi-pilot scale, sharp falls in price are likely. Even at this price enriching bread with lysine would not cost more than 2 cents a loaf. Indeed, this is already being done, though the lysine-fortified bread has to be sold as a specialised product; the normal white bread loaf could not be lysine-fortified without changes in U.S. bread composition regulations. Another bakery firm is making a lysine-fortified biscuit, mainly for the children's market.

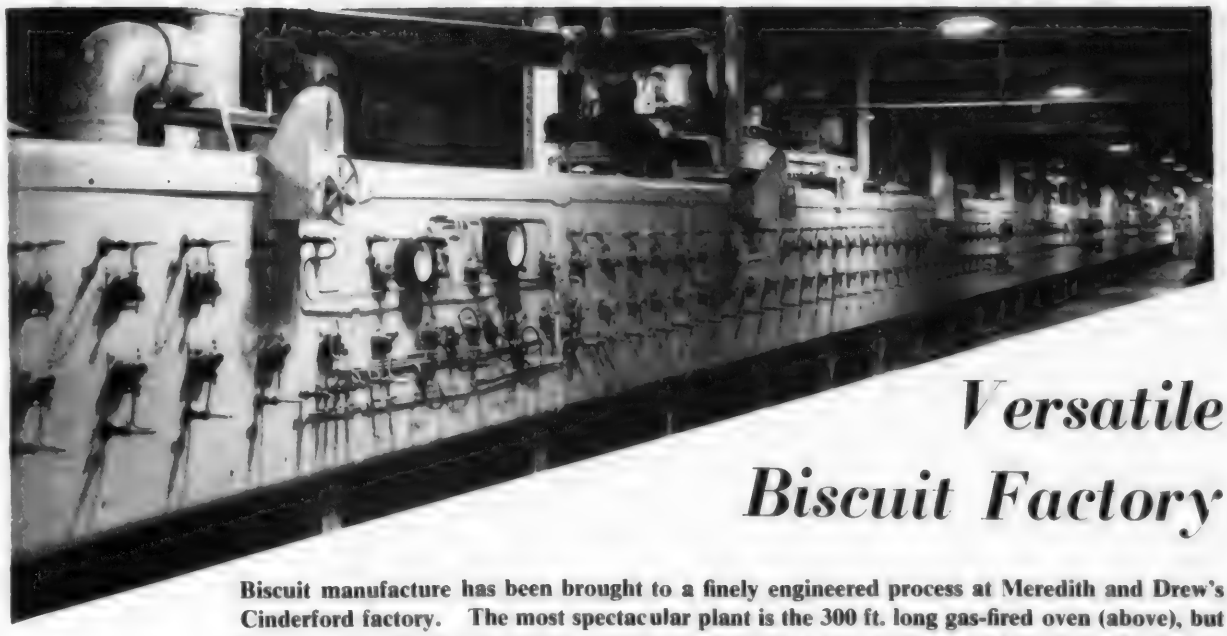
The use of synthetic amino-acids as food additives is often scientifically justifiable. Not all diets, human or animal, provide sufficient protein variety to ensure an adequate intake of all the vital amino-acids. The trouble seems to be that countries with the resources to make amino-acids are also sufficiently rich to enjoy a satisfactory diet. Where the average human diet is poor and unvaried—particularly the predominantly cereal diets—the need for amino-acid fortification is pronounced. Lysine is especially required. In such areas manufacture must be financially and technologically improbable and it is just as difficult to visualise an ability to buy imported amino-acids.

Mutton for a lover

"PEOPLE used to say I'm nuts," admitted Bill Pickering, the Bloxwich swimming baths superintendent, when he recently swam the Channel after a much publicised reluctance to start. And he went on to say that indeed he is very fond of nuts, which are good protein food and help to produce the exceptional endurance which a long-distance swimmer needs.

Mr. Pickering is a staunch vegetarian, and explains his success in the Channel as due to rigid training and a meatless diet. Shrugging off the charge of being a crank about food, he pointed out that all he ate before his Channel swim was a cheese sandwich, but he was able to run out of the sea when he'd finished.

Vegetarianism is not likely to gain converts as a result of Mr. Pickering's advice, since most of those who subsist on this kind of diet seem to do so for aesthetic or moral reasons. Personal character contributes more to physical and mental performances than diet, and those who claim that their health and efficiency depend upon certain foods invariably have opposite numbers who claim that their achievements are due to eating entirely different foods. Sandow, the celebrated "strong man," ate over 1 lb. daily of roast beef, chicken and veal, while Edmund Kean the actor would choose his dinner according to the part he was to play (pork for a tyrant, beef for a murderer and mutton for a lover). All the famous vegetarians of history have had strongly developed personalities, just as had all the famous meat-eaters. And here it is pertinent to add Mrs. Patrick Campbell's remark to that most celebrated vegetarian, Bernard Shaw: "Some day, George, you'll eat a pork chop, and then God help womankind!"



Versatile Biscuit Factory

Biscuit manufacture has been brought to a finely engineered process at Meredith and Drew's Cinderford factory. The most spectacular plant is the 300 ft. long gas-fired oven (above), but there are several other ingenious machines embodying a long tradition of biscuit-making know-how. The result is a versatile and flexible plant, quickly responsive to consumer changes in the highly competitive biscuit market.

TELEVISION viewers recently were given by the B.B.C. a momentary glimpse of an aspect of food industry which many found surprising. The screens depicted a 300-ft. gas-fired continuous oven in which is baked much of the biscuit output of Meredith and Drew, Ltd., at their Cinderford factory in Gloucestershire.

The choice of this remarkable piece of biscuit-making equipment —to illustrate the fact that many modern industries contribute little or nothing to the much publicised problem of atmospheric pollution —was influenced by the fact that it is by a comfortable margin the longest oven of its kind in this country, and by its almost clinical cleanliness. Many viewers, however, may have wondered why Meredith and Drew should need 100 yards in which to cook a biscuit, which most housewives would contrive to do in a domestic oven.

Oven economics

The answer, of course, is in the great gulf which lies between the rate of output of the two cooking operations, but it also brings to light a fundamental principle of food processing which in present conditions of keen competition and high plant costs very few producers can afford to ignore. A biscuit oven to-day will vary in cost according to its length, whilst the ancillary machinery to complete the plant line will represent from £20,000 to £30,000 additional capital investment whatever the length of the oven.

The policy is therefore to use the longest possible oven that is commensurate with economic runs on individual biscuits.

The policy thus represented is the keynote of the entire factory at Cinderford, reflected both in layout and production procedure; and significantly it has been wholeheartedly adopted in the U.S.A. There only can one see biscuit ovens longer than the Cinderford one. There, in fact, some biscuit ovens have attained 500 ft.; but the utility of elongation on that scale becomes questionable—when it is added that production managers have been obliged to use bicycles!

The Cinderford oven, however, is only one characteristic item of an assembly which has been "tailor-made" for economical biscuit making, having long runs as its chief objective, but endowed with sufficient flexibility to be quickly adaptable to whatever fluctuations public demand may impose. It is widely regarded as a model for modern practice in moderate to large-scale biscuit production, and when demand justifies it the whole assembly can readily be scaled up to a very much larger target, or a different type of biscuit, without seriously interrupting production or abandoning any of the plant or principles now operating there.

Layout

When the Cinderford plans were laid down, in 1950, it was apparent to Meredith and Drew that the ideal objective for smooth and economical biscuit manufacture is a straight production line. All the plant was accordingly designed to conform with that, and the architects were required to produce a structure in which such equipment could function best. There is, however, one important modification of the "straight line" principle, which takes account of the fact that between a well-designed raw materials intake at one end and a modern packaging and dispatch section at the other any lengthening of the production sections may prove a physical impos-

COMPOUND MAKING. The Atlas Rotosan oil and fats treatment plant. On the right are the two tanks in which the homogenised oils are rested before use.

sibility. To lengthen the run to provide, for example, new scope for chocolate enrobing could only be done by turning the production line back on its tracks.

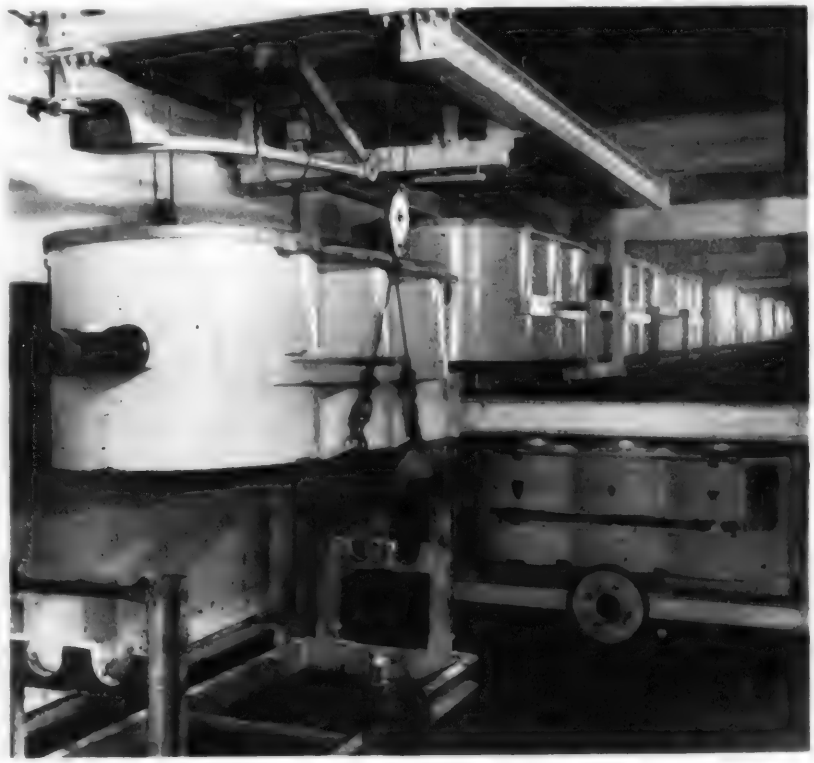
Cinderford's solution of that difficulty has been widely noted because, in conjunction with certain other architectural principles, it has resulted in a factory which can "grow" in three directions whenever the need arises. All the immovable essentials, the raw materials bays, the administrative offices and staff rooms, and the dispatch section have been grouped conveniently close to each other near the centre of the southern face of the building. Within the 10-in. cavity wall, between this block and the main factory, are located all the services—water, electricity, gas, compressed air and steam from a power-house standing at a safe distance from the biscuit plant—so that this façade is the only component of the factory which cannot easily be re-sited when it becomes necessary to expand. This layout has necessarily required that the delivery line should be turned back at its end to the centralised dispatch. It is obvious, however, that if anything must move "counter-current" in such a flow line as this it is best that it should be the cartoned or canned finished product.

Gravity flow

This preoccupation with architecture has borne fruit even more conspicuously in other directions. The steeply sloping factory site might well have seemed very unattractive. Meredith and Drew, recalling their wartime experience of laying down biscuit plants in an Oldham cotton mill, a furniture factory and an ex-iron foundry at Halifax, with the casting sand floor well below ground level, have made the differing ground levels manifestly an asset. The hill on which the factory stands has disposed of the need for mechanical handling at several manufacturing stages.

Although the factory is built at two elevations, delivery and dispatch have their bays on the same service road. Raw materials are taken in at the "summit" and thereafter their movement towards the packaged product stage is at many points simply a gravity process. Oils pumped in from the tankers at the top flow in measured quantities to the blending tanks, from whence they are delivered by gravity feed to the "Atlas" Rotosan compound making unit.

Liquids, however, can be pumped with relatively little trouble or expense. The movement of solid ingredients, especi-



FERMENTATION. These dough tubs, weighing about 10 cwt. with their contents, are raised by winch on to the dough tub railway and moved to the taking-off point when their ferment period—usually 8-12 hr.—is completed.

CARTONING. This biscuit tray cutter and former produces from 80-100 trays per min. from a reel of card. It was primarily designed by the managing director.

ally of flour, is often laborious and time-wasting. Meredith and Drew's flour arrives with the other raw materials at the high level. Sacks from this store have only to be discharged into hoppers and the flour flows down to the mechanical sifters below. Sugar and chemicals similarly are fed into polished metal chutes, so that supplies are automatically replenished as material is withdrawn in the dispensary below.

Apart from easy handling, this principle is an important factor in helping to ensure that biscuit materials are free from the risk of contamination. Seldom are they fully exposed to the atmosphere until the dough reaches the moulding and cutting section, and there air conditioning, scrupulously cleaned tiled surfaces, and special devices such as magnetic metal detectors, make it reasonably certain that the baked biscuit contains nothing that was not specified by the recipe in the dispensary.

The complementary precaution is to ensure that the materials received are in all respects fit for their purpose. That is one of the chief functions of the laboratory in which all variable materials are tested, with the help of girl laboratory assistants, by two chemists, one of whom is a cereals expert. Certain small differences in flour characteristics can be of vital importance in biscuit making. Other routine studies are of the p.v. of oils and fats and of the plasticity of doughs, and as they both lend themselves to instrumental techniques much of this can be done by the assistants.

Processing

The element of mechanical handling and of gravity flow is very well exploited in the processing of these materials between the dispensary and arrival at the moulding and cutting bands. All ingredients come *via* a chute to a tin-plated steel dough tub which has been moved on its rubber-wheeled bogey into position below. Nearby is the electrically-operated mixer head, which descends from the ceiling to make a complete closure of the open top of the tub until the dough mixing is finished.

From this point onwards, carefully controlled temperatures are of decisive importance, so important, in fact, that the atmospheric conditions throughout the factory are recorded and the readings are shown continuously on the dials of the Watford recording panel in the administration section. Nowhere is atmospheric control more important than in the fermentation, which immediately follows the mixing.

To maintain constantly the relatively high temperature required here would commonly involve the use of considerable electrical or steam heat. Much more economically, Meredith and Drew, by an architectural strategem, make use of the waste heat from the three lines of gas ovens. The original policy of putting the ovens underground was evolved when the company adapted a "difficult" building to form its Halifax factory. There it was the logical solution of a space problem—and it yielded advantages beyond what had been foreseen. At Cinderford, the oven lines have in effect been inserted into the hillside, and the ferment room which they heat shares some of the same site area.

The ferment room has virtually to be insulated. Spring-loaded, rubber doors permit the dough tubs to be pushed through and shut immediately they have passed. Most fermented doughs are made on what is called the sponge and dough principle. This means in effect that they have to be remixed after the first fermentation time. That problem was very well overcome by making the dough travel round a horseshoe circuit at high level to emerge at the point at which it entered. Incoming tubs are raised by winch—they weigh with contents about 10 cwt.—and coupled by hand to the last tub on this horseshoe roller conveyor. An electric winch draws the whole train forward one tub length. Thus they are moved at a regulated rate until, fermentation completed, they can be lowered on to their wheeled carriages from the opposite extremity of the horseshoe and taken back to the mixer. For their final fermentation they remain on their wheeled carriage on the floor, emerging in due course at the opposite end of the ferment room immediately above the biscuit machinery.

From this point the whole factory forms three continuous lines of biscuit-making machines, of ovens, and of packaging bands. Should the processing be interrupted on one line neither of the others is affected.

Gravity feed is again the solution of the problem of conveying the dough mix to the rollers and cutters. An air hoist and tipper lifts the tub and gradually inverts it over a chute, so that its contents are deposited at the starting point of one or other of the machine lines.

Versatile machines

At Cinderford, dough rolling appears to have reached a stage technically more advanced than anywhere else. This is indicated in many ways, and not least by the fact that the three lines operate almost entirely automatically, rolling the dough sheet, cutting it and delivering the biscuit blanks at the start of the oven lines, while the

surplus cuttings are returned by the overhead bands to be rolled again.

Like many others in the factory, these machines are of the company's own design. Perhaps the outstanding example of this is the laminating machine, which does what, until recently, was thought impracticable. While a commercial model that will do this has lately become available, Meredith and Drew have had their own design in use for some 18 years at their various biscuit factories.

The same individuality characterises the three oven lines, all of which were designed to the company's specifications. The biscuit bands travel horizontally between the gas burners, and the baking process can be watched through windows placed at appropriate intervals, at which are hung control specimen biscuits. Thus the colour development of the bake at particular stages can be closely regulated by adjusting the heat input and the rate of travel of the biscuit band. At the end of each oven is a cooling zone where a forced draught brings down the temperature of the biscuits to enable them to be packaged almost immediately.

Packaging problems and answers

It is a tribute to the effectiveness of the automatic handling and mechanisation principles at Cinderford that 65% of all the operatives employed there—500 operating multiple shifts—are engaged on packaging rather than production. That illustrates a situation common in many manufacturing industries, arising in part from the great recent increase in the demand for pre-packaging and smaller packs. The packaging section layout, apart from the condition that it should continue the three straight production lines, was left to be determined by sales demands, and was not made to conform rigidly to a pre-arranged plan. It is the largest individual section of the factory, as well as the most populous. It is designed as one single open room without pillars or obstructions and no machinery is fixed.

PACKAGING. Small savoury biscuits are automatically delivered in weighed quantities down the chutes to fill the bags handled by the packaging teams on both sides of this packing band. Output per operative is about 800 bags per hr.

Here, as elsewhere, the architects' contribution has been important. The specially heavy roof trusses permit much heavy plant to be suspended, avoiding floor congestion. Packaged biscuits are carried away on overhead conveyors, and at several points air-operated lifts are used to take the tins quickly to the higher level, where an ascending conveyor belt would have demanded substantially more space.

Much has been done to mitigate the relatively heavy labour demand which packaging makes. A typical problem is the growth of popularity of small packs of savoury biscuits—to retail at 3d. or 4d. The labour requirement for this packaging work has been kept down to 12 by skilful reduction of the manual operations. A shaker equally distributes these small biscuits on the wide overhead belt, from which they are diverted by guides of varying lengths, so that equal, measured quantities fall in batches down the packers' chutes. A forced draught opens the *Glassine* bags, which are sealed by a momentary pressure of the hand. The effectiveness of this may be gauged by the fact that these packers individually average about 800 of these small packs per hr.

The packaging section provides much other evidence of the continually increasing importance of engineering in the food industries. In the carton section, for example, a rotary machine (of which the managing director was the prime designer) can supply biscuit trays cut and formed from a printed reel of card at rates of 80-100 per hr. Air brakes are used at a number of points to regulate the feed, by gravity, of empty tins and cartons to the packaging bands; and individual engineering skill has conspicuously been used to deal with the problem of the occasional short-weight or overweight pack.

The solution of the weight problem has been found in a check-weigh system by which each filled tray is made to actuate a scale pointer, the travel of which is monitored by a photo-electric cell. Thus any underweight or overweight pack is made to operate a solenoid and is then diverted into the reject chute. Each of these check-weighs can deal with some 80 trays a minute, and rejects can have their weights adjusted by one girl using a conventional weighing machine.

Everywhere in the Cinderford factory is evidence that the attainment of the most efficient means of

production has been the prime determining factor, rather than economy of capital outlay. It follows that a continuous high rate of output is a necessity. It is very desirable, for example, that each production line should have a continuous run for two days each week at least making the same line. It is largely to facilitate this that the factory has its own teleprinter equipment over which is sent each night full details about the movement of stocks from each of the ten distributing depots. Thus the whole trend of sales can be graphed day by day, and so production can be timed and adjusted to meet the sum total of these regional stock variations at the appropriate moment. This close integration of production and sales confers another advantage more essential in the biscuit trade than in most other food industries. No production is surplus to current requirements and the demand which will develop in the immediate future. Thus stocks can be limited to approximately one week's supply of the 30 branded lines in the two Meredith and Drew packs. It is the best assurance that all these lines will have the merit of being perfectly fresh and crisp.

Baking Research at Chorleywood

THE efficiency of mixing processes, the steam glazing of bread and the thermal efficiency of ovens were among the problems investigated by the British Baking Industries Research Association last year, according to the report of the director, Dr. J. B. M. Coppock. Research is divided into four main divisions: bread, flour confectionery, biscuits and general.

Bread

Work in the bread division has covered preservation, investigations into the use of mineral oils as dough divider lubricants, studies on dough testing instruments, the refrigeration of doughs, dough production, bread weight, trace elements in bread, flour storage, yeast storage and quality, the use of skim milk powder, the "brown serve" method of baking, dough tests for small bakers, factors affecting gas production, the effect of salt in bread making and studies on methods of anti-staling and retention of crumb softness.

These last have included work on the properties of the natural oils in flour and bread and have led to the conclusion that the flour oil fraction is important in determining bread quality and is closely linked with the mechanism of bread improvement by oxidising chemicals and shortenings. To determine the effect of small quantities of flour oil fractions in bread, a semi-micro baking method has been developed. The effect of crumb softening agents of the mono-glyceride type and of dough water on bread yield, and moisture content was also investigated. While the amount of water used and the baking oven conditions are probably the two most important factors affecting the yield and moisture content of fresh bread, the crumb softening agent itself appears to have a negligible effect.

Flour confectionery

Fondant stickiness was among the problems examined in the flour confectionery division. Laboratory scale experiments showed that when fondant-covered cakes are to be wrapped or packaged in any way the fondant should not contain more than about 12% glucose. However, commercial trials showed that S.T. 300 cellulose film could be used to wrap fondant-covered cakes irrespective of the glucose content, and L.S.T. 300 semi-moisture resistant cellulose film was satisfactory for glucose contents of 12% and less. M.S.T. 300 cellulose moisture resistant film was unsatisfactory. It was also found that with a glucose percentage of less than about 12% hardening took place too rapidly.

Other research in this division included studies on emulsions and emulsifying agents, batter stabilities in cake, problems of cake and flour confectionery storage, the quality of egg products, cake flours, the uses of soya flour, dry mixes, refrigeration of flour confectionery and the effects of invert sugar on cake quality.

Biscuits

Experiments on the effect of biscuit moisture on the development of oxidative rancidity are continuing. It has been shown that moisture can have a distinct delaying effect on the development of oxidative rancidity. Experiments to test the consistency of the accelerated storage test for biscuits has shown that it is not always easy to reproduce results. Baking time appears to affect stability considerably, but other factors also appear to have an effect. Indeed, the stability of the shortening is only one of the factors influencing the susceptibility to oxidation of the biscuit. Peroxide values of the fat in biscuits stored in the same container can vary over a wide range. They cannot always be directly correlated with off-flavour development, and organoleptic tests still seem the most satisfactory means of detecting rancidity.

Other subjects covered by the biscuits division included physical measurements on biscuit and wafer flours and their relation to baking practice, checking or cracking, extraneous materials in biscuits, ice cream wafers, packaging problems, microbiology of flours, biscuit structure and bloom and moisture content, and the water-retention of short-sweet, hard-sweet and water biscuits.

General

The subjects examined in the general division ranged from a review of bakery equipment and machinery to the determination of coconut and egg in baked products. Methods of improving bakery hygiene, foreign matter in cakes, food spoilage and vitamin losses in the preparation of baked products were investigated. Physiological studies were carried out on pharmacological aspects of food additives, finished products, and construction materials.

RECENT ADVANCES IN

Starch Chemistry and Manufacture–1

By Eric F. W. Dux, Ph.D., M.Sc., A.R.I.C.

The chemistry of starch, which was still enigmatical 15 years ago, has now been elucidated to such an extent that one can describe it with some measure of certainty. It is now possible to synthesise in the test tube a starch which is chemically indistinguishable from the native product, except that in vitro methods have so far failed to reproduce the granule, which is characteristic for starch from a particular botanical source. This work has been made possible by the discovery of starch-producing enzymes in some plants, notably the potato. The recognition of the structure of starch has made it possible to forecast, explain and prevent many phenomena known to its user, and it is the purpose of this review to give a brief account of some of them, particularly as they affect the food manufacturer.

The chemistry of starch

BASICALLY all starches, whatever their origin, consist of a polymer of anhydro-glucose units of very high molecular weight. Most starches contain two components, amylopectin (4 parts) and amylose (1 part), the exceptions being the waxy starches which are almost pure amylopectin and the starch from the wrinkled pea, which contains a major proportion of amylose.

Apart from these polysaccharide materials, starches are accompanied by small amounts of non-carbohydrate materials. All starches contain some phosphate which is esterified to the amylopectin, and, especially in the case of cereals, there is some protein matter. This protein (gluten) plays a great part in forming the characteristics of wheat starch, for instance its property to produce a dough when mixed with water. Potato starch contains no gluten and does not form a dough. The protein content of cereals is high enough to make them a valuable source for the production of animal feedingstuffs.

Both amylopectin and amylose are composed of long chains of glucose units, these being mutually linked through their 1 : 4-carbon atoms. In the case of amylopectin the length of these chains is about 20-25 units, depending upon the source of the starch, and one chain is linked through carbon-1 (reducing end) to carbon-6 contained in another chain. In Fig. 1 the relative positions of carbon atoms is

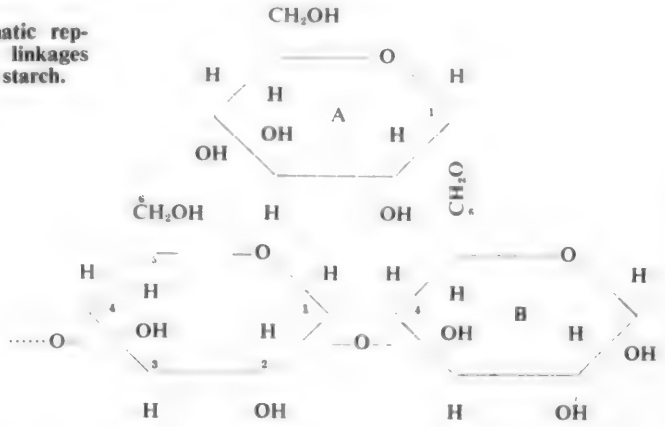


Fig. 1. Schematic representation of linkages occurring in starch.

shown. Glucose unit "A" represents a non-reducing terminal group and unit "B" shows a reducing chain end. The hydroxyl (-OH) groups attached to carbon atoms 1 are shown in the α-position. By continuous linking of chains an enormous molecule is built up, linked at random and forming a complicated network. Amylopectin is soluble in water, giving a stable, clear solution which does not retrograde easily, and which gives a reddish-violet colour with iodine.

Amylose, on the other hand, contains very long chains of glucose units, containing probably 600 or more of these units. It was formerly believed that amylose was essentially a straight chain, but recent work has shown that it contains a limited number of branch points. It is probably this very low degree of branching, which varies between amyloses of different plants, which causes the characteristic behaviour of starches. Amylose is responsible for the blue colour which starches give with iodine and, although soluble in water, it retrogrades very easily. It is for this reason that waxy starches, which are devoid of amylose, are so very stable in solution.

The essential difference between starch and cellulose, which also contains glucose as the sole building unit, is a configurational one. In cellulose the glucosidic linkages have the β-configuration, which may be shown by inverting the carbon-1 hydroxyl group in Fig. 1. In starch the great majority of links are α-oriented. It is now believed that the anomalous branching link in amylose may be β-oriented.

Amylopectin and amylose occur together in the native starch granule, which has a physical shape characteristic for any one starch. Very little is known why the granule from potato should appear as large, rounded particles,

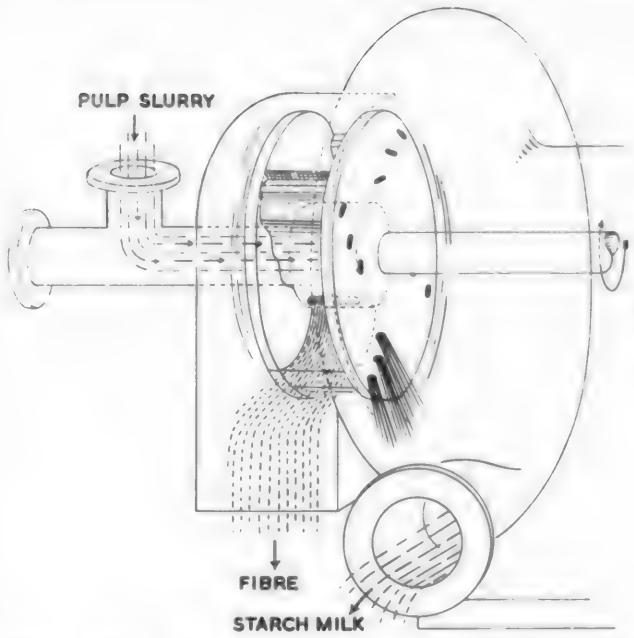


Fig. 2. The action of the rotosieve.

whilst that of rice should be much smaller and angular. This curious phenomenon, which is of so much help in identifying starches, is probably connected with the peculiar enzymic system which synthesises starch in the plant.

Recent work, carried out principally under the guidance of Prof. S. Peat, has done much to elucidate the process by which starch is formed within the plant. It was found that at least two distinct enzymes are necessary to produce the major component, amylopectin. Initially a straight chain polymer of glucose is synthesised by phosphorylase, or "P"-enzyme, using glucose-1-phosphate as substrate. The latter compound is itself synthesised with the help of a complicated system of enzymes. These long, straight chains, some of which appear later as amylose, act as substrate for "Q"-enzyme when they have reached a critical length, this enzyme producing amylopectin. The process is caused by a transglucosylation, a reaction which involves the removal of short "donor" chains and attaching them along "acceptor" chains. The proportion of amylose to amylopectin in the final starch is dependent upon the Q : P-ratio. Prof. Peat has recently written a very comprehensive review of present-day knowledge of starch[1] to which readers are referred. Neighbouring starch molecules may be linked together by hydrogen bonds between hydroxyl groups. These bonds have been shown to exist in the granule, in starch solutions and in the retrograded state. The recognition of hydrogen bonds in starch has contributed much to present-day knowledge, and such phenomena as thixotropy, gelation and retrogradation have been explained in this way. The consistency of blancmanges and the staling of bread in particular are discussed in this review as a consequence of hydrogen bond formation.

Manufacture of starch

The extraction of starch from the plant and its purification have been completely revolutionised since the war by the elimination of old-type machinery and its replacement by entirely new techniques. In particular, vibrating screens have been superseded by rotosieves and starch tables by centrifugal separators and, in some instances, by hydrocyclones. The introduction of these machines has resulted in a great saving of space and cost and has given a much improved product. A description of a typical plant, as in use today all over the world, is given below. As an example the manufacture of potato starch is outlined, but the processing of maize or wheat is essentially the same, although some modifications have to be made.

The pulp slurry, having been obtained by rasping potatoes in disintegrators, enters a battery of rotosieves, arranged in series. These machines show a certain resemblance to a centrifugal pump. However, sieve plates of special design, having their concavities in the direction of rotation, have been substituted for the impeller vanes. The sieve plates are slotted and are made of nickel or copper. The pulp slurry enters through a central feed pipe and then flows radially outward along the sieve plates, exerting a strong pressure on them. The pressure developed in this way—by centrifugal force—is used to drive the liquid carrying the finer particles, as starch granules, through the slots in the sieve plates. The liquid phase (starch milk) then leaves the rotosieve through an outlet for liquid discharge on the side of the machine (Fig. 2).

The coarse solids, such as fibre, cannot pass through the slots. By centrifugal force they slide on the front surface of the sieve plates to the periphery and are then discharged through a separate outlet below the rotor. Generally, four rotosieves are connected in series. A starch concentration of approximately 3° Bé. is obtained compared with 0·8°-1° Bé. with older methods. The manufacture of starches of high protein content (wheat, maize) is rather different in its initial stages. Gluten has to be extracted first, this usually being done by kneading the raw starch with water in a dough mixer and extracting the soluble gluten by means of a water spray. This solution is then passed to a flash drier and the solid protein processed into cattle food.

The coarsest impurities having been removed from the starch, it remains for the milk to be further concentrated and any remaining fibre and gluten to be removed as far as possible. These processes are carried out in machines of varying designs, but the centrifugal separator, such as manufac-

tured by the Alfa-Laval Co., has found much use (Figs. 3a and b).

The principle of the machine depends largely on that of decantation, replacing gravity by centrifugal force. The rotating part of the centrifuge consists of a number of conical plates, which are arranged one above the other around a vertical hollow shaft. The plates slope downwards at an angle of about 45°, and the distance between them may be 1 mm. or less, depending upon the actual materials to be separated. The starch slurry, coming from the rotosieves at a concentration of ca. 2·6°-3° Bé., is fed in at the top of the machine under pressure and led in between the plates. The relatively heavy starch granules are thrown outward, and having met the inner, *i.e.* lower, side of a plate, slide toward the periphery under centrifugal force and are ejected through nozzles. This operation has resulted in concentration of starch slurry, and in order that any remaining impurities may be removed, water is pumped in under pressure through the shaft and washes the starch granules immediately before these reach the exit nozzles. Water separated between the plates flows inward along the upper, *i.e.* outer, surface of the plates and is collected in channels and removed through a separate exit near the top of the machine.

Special precautions have to be taken when dealing with starches, such as potato starch, which tend to cause excessive frothing. A battery of four rotosieves requires three centrifugal separators. With this assembly, starch concentrations of ca. 23° Bé. may be obtained, although in this case some starch losses occur. At a more usual final concentration of 20° Bé. the plant can deal with 4½ tons starch (dry basis) per hour.

Finally, the starch is passed to the refining section, where remaining impurities, solid as well as dissolved, are separated. The chief instrument here is a centrifuge, working intermittently, the separation taking place in an open, imperforate drum.

The starch is then partially dried on vacuum filters and the final moisture content reduced to ca. 20%, this being effected on driers of varying designs.

A flow-sheet of a typical layout is shown in Fig. 4. For clarity's sake only the essential connections are shown.

Fig. 3a. Diagrammatic cross-section of De Laval centrifugal separator.

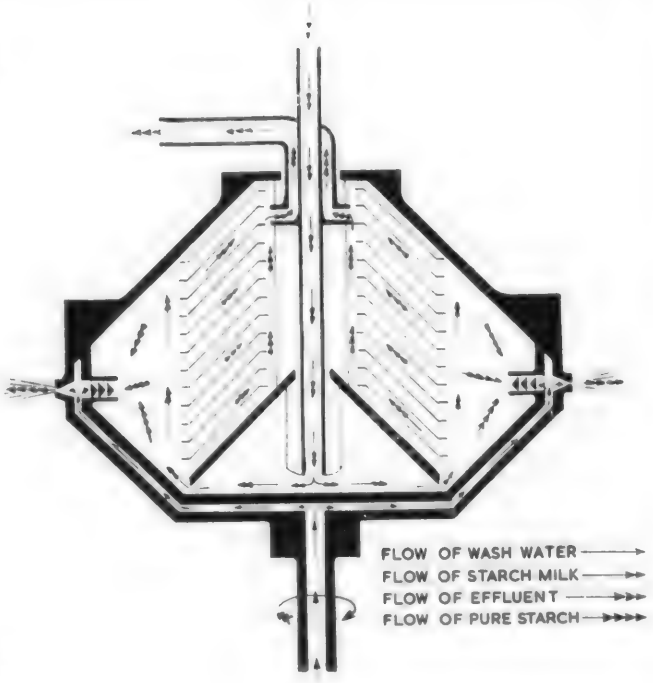
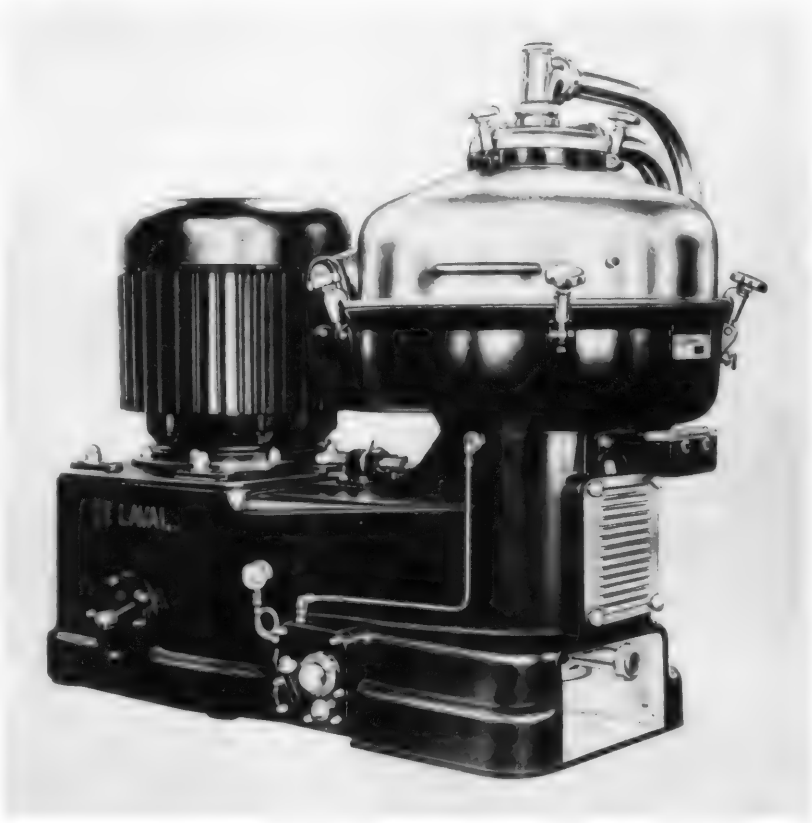


Fig. 3b. De Laval centrifugal separator.



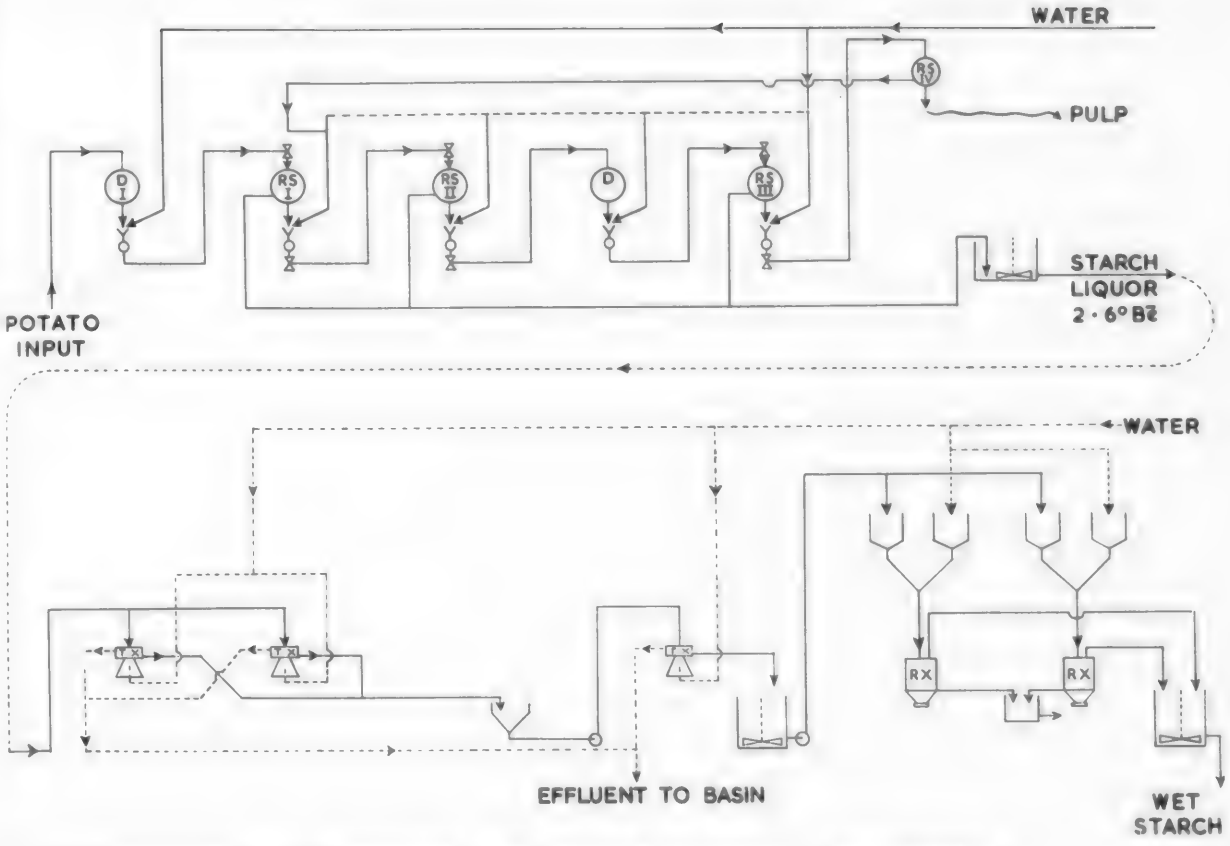


Fig. 4. Flow-sheet of potato starch plant.

Hydrocyclones

A surprisingly simple device for refining and concentrating starch milk has been developed by the Dorr-Oliver Co.

Basically it consists of a stationary cyclone into which the slurry is pumped. The cyclones themselves are cylindro-conical and are assembled as either a single rubber block containing 24 15 mm. dia. units or 32 or more single *Bakelite* units 10 mm. in diameter, fitted into a common stainless steel, bronze or plastic-lined cast-iron housing.

For special purposes, for example corn starch filtrate clarification, three such blocks or groups of *Bakelite* cyclones are assembled as a vertical battery, forming a 3-stage unit.

The feed to each cyclone is introduced tangentially into the upper section under pressure.

Relatively coarse materials are thrown outward to the walls of the cone, where they collect and pass downward and out of the unit through an underflow opening. Fine particles move inward and, together with most of the water, pass upward and out through the overflow opening.

For each single block or group of cyclones there are common chambers for introducing feed and withdrawing over- and underflow.

Control is extremely simple and is accomplished merely by regulating the back pressure on the underflow chamber of each stage. Increasing back pressure increases the density of the underflow discharge and decreases the volume ratio (underflow divided by feed).

Pressure requirements vary depending upon application, but in every case increased pressure results in finer separations.

In the manufacture of starch a number of different cyclones are required, depending upon the type of work to be performed.

The process (Fig. 5) can be roughly divided into three stages:

Stage 1: Removal of sand and other heavy impurities from the starch milk.

Stage 2: Concentration of the starch and removal of the soluble protein, insoluble protein, fibres, etc.

Stage 3: Refining by countercurrent washing in 6-8 steps.

The starch leaves the final washing cyclone with a concentration of 22° Bé. and is then passed to a normal drying plant.

Hydrocyclones can be used for refining in conjunction with existing centrifuges, or they may replace the latter entirely. Generally, hydrocyclones have much lower installation and operation costs than centrifuges. They also have greater flexibility and simpler operation and control features. The system is entirely enclosed, eliminating bacterial contamination in the cyclone system.

Manufacture of glucose

The production of glucose (or

starch syrup) has recently been revolutionised by the introduction of the continuous process of K. Kroyer[2] (Fig. 6). Hitherto it has been the custom to autoclave a starch solution with acid until the desired degree of conversion had been obtained. The reaction required up to 1 hr. and was necessarily a batch process. The new method is continuous and can be made entirely automatic, needing very little supervision. Total conversion time is about 4 min. and the product is of very high quality.

Briefly the stages of manufacture are as follows: starch is mixed with water to a slurry and the required amount of acid is added by a metering device. The milk then runs through a special pulsating membrane pump which forces the material through a heat exchanger at a pressure of 20 ats. The exchanger consists of three annular pipes, the outer and central pipe being heated with live steam to about 150°C. The middle pipe carries the starch slurry, which thus does not come into direct contact with steam. The central pipe is arranged slightly eccentrically with respect to the middle (starch bearing) pipe, so that the combined action of the pulsating rhythm and the spiral movement gives a kneading action to the starch paste. Before leaving the high pressure zone, the syrup is automatically neutralised by the addition of soda, the dosage of which is regulated by a *p*H meter. The syrup next passes through a pressure relief valve into a cyclone and then into a continuous system for decolorising with active charcoal followed by evaporators. When leaving the converter the syrup has a concentration of 47° Brix, which is increased to 83° Brix in the evaporators. The standard size plant has a capacity of 20 tons syrup in 24 hr. The system can be easily adapted for simultaneous production of starch syrup and dextrose, the latter requiring a somewhat greater length of the converter. In this case the converter is tapped at a suitable point for removal of syrup.

A number of Kroyer plants have been in operation since 1952 and it is interesting to note that users of the process hold annual meetings to discuss problems of mutual interest. It is now generally agreed that the process is reliable and economic. The constitution of syrup is practically identical to that obtained from the autoclave process. The colour is light and requires only one treatment with decolorising charcoal. Dextrose solutions made by the Kroyer process are found to crystallise more rapidly than hitherto.

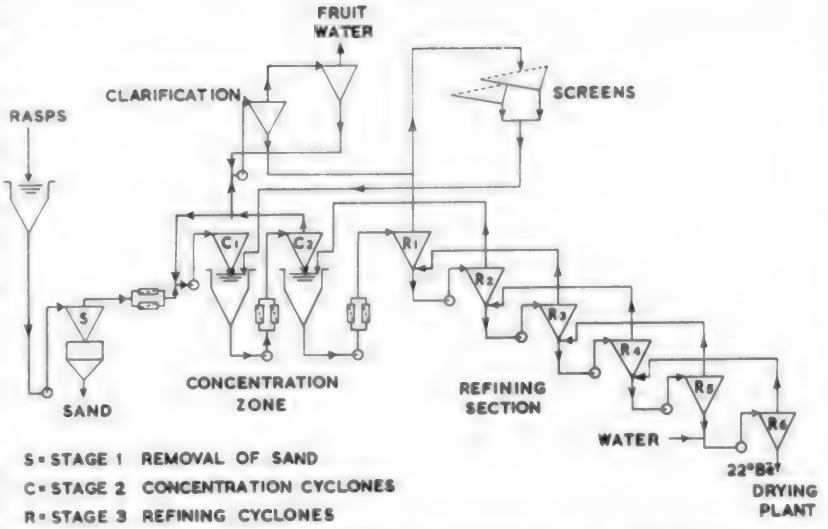


Fig. 5. Flow-sheet of potato starch manufacture with hydrocyclones.

Steam consumption is lower than during autoclaving, being ca. 0·4 kg. steam at 8 ats. per kg. syrup (83° Brix) produced. Since the process employs high pressure and velocities, some corrosion was originally noticed. Since copper ions are known to cause discoloration of the syrup as well as increased conversion, a recent plant was fabricated from molybdenum-stainless steel. Corrosion and other teething troubles have now been overcome, and the Kroyer process has found increasing use in many countries. Both potato and corn starch have been used with equal success. By regulating the conditions of conversion, syrups containing dextrins of any desired degree of polymerisation may be obtained.

Enzymes

The starch-degrading enzymes, amylases, which have found commercial application, can be divided into two classes. The division depends largely upon the initial products of the action of an amylase on the substrate. The first, and most important, class embraces enzymes normally obtained from living sources, such as saliva, bacteria or fungi. These enzymes, the α-amylases, are characterised by very rapid liquefaction of a starch paste, followed by production of a soluble starch. During this period there is no great increase in reducing power, *i.e.* there is no appreciable liberation of simple sugars. If left in contact with the starch solution for a longer period, the ultimate products are low molecular weight sugars, such as maltose, maltotriose as well as "limit" dextrins. α-amylases are well known for their great resistance to physical influences. They can withstand boiling water for some time and considerable variation of *p*H. It will be seen that α-amylases do not reduce starch completely to simple sugars, and the mode of their action is as follows: α-amylase attacks a starch molecule, breaking at random the 1 : 4-linkages joining glucose units both in amylose and amylopectin. The enzyme is, however, quite incapable of breaking the 1 : 6-bond, by which chains are attached to each other in amylopectin. The action will therefore be halted when such a linkage (and indeed the neigh-

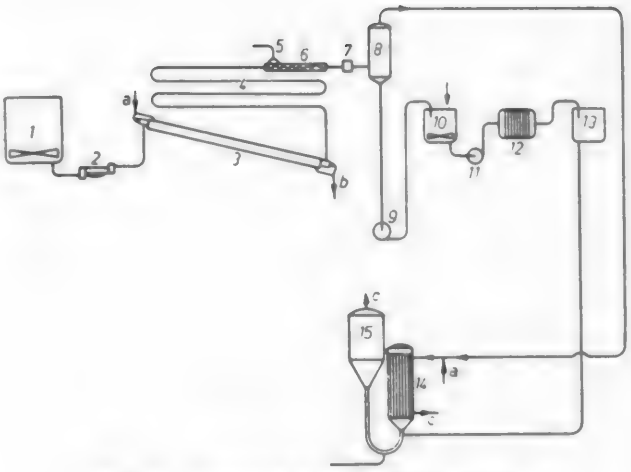


Fig. 6a. Diagram of Kroyer glucose process.

1. Starch-water mixing vessel.
2. Membrane pump.
3. Heat exchanger.
4. Reaction zone.
5. Addition of soda.
6. Neutralisation zone.
7. Reduction valve.
8. Pressure-relief cyclone.
9. Pump.
10. Mixer for charcoal.
11. Pump.
12. Filter press.
13. Vat for syrup.
14. Evaporator.
15. Evaporator.
a Steam.
b-c Condensed water.

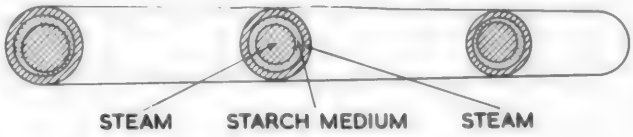


Fig. 6b. Section of Kroyer heat exchanger.

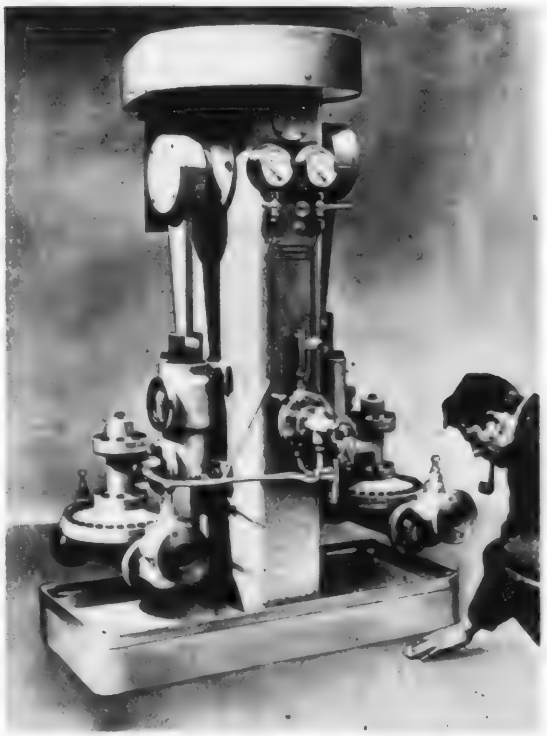


Fig. 6c. Master pump used in the continuous production of glucose from starch by the Kroyer process.

bourhood of the link) is reached. It is this accumulation of the remainder of the original starch, each molecule containing one 1 : 6-linkage and at least three 1 : 4-linkages, which constitute the limit dextrins (Figs. 7 and 8).

In contrast to the α-amylases stands a group of enzymes normally obtained from plant sources. These, the β-amylases, may be found in barley malt extracts. Their mode of action differs from that of the α-amylases in that two glucose units at a time (*i.e.* maltose) are removed successively from the non-reducing end of the starch molecule, until the branching 1 : 6-linkage is reached. This, as before, halts the action of the enzyme unless a de-branching enzyme is present. In practice β-amylases are known for their initial high production of reducing sugars, whilst the viscosity of the starch solution only falls slowly. For maximum rate of starch breakdown to sugars it is usual to initiate rapid action with α-amylase, which breaks open the molecule, followed by addition of β-amylase. The action of any of these enzymes may be halted at any particular stage by thorough boiling or alteration of the *p*H. In many cases the progress of hydrolysis may be followed by using the starch-iodine reaction, the achroic point (*i.e.* no coloration) being reached when the length of starch chains has reached about 6-8 glucose units.

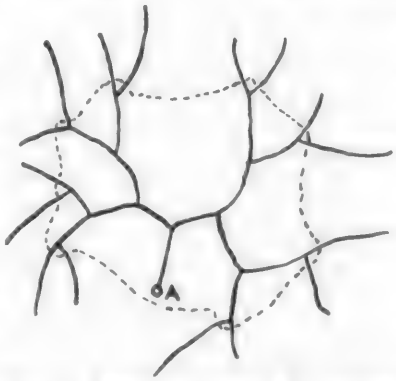


Fig. 7. Ramified structure for amylopectin. A = aldehydic end group
..... = limit of initial β-amylase action

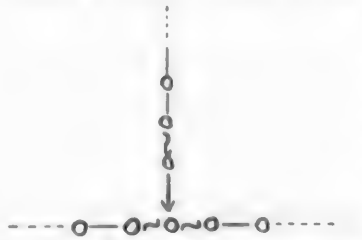


Fig. 8. 1:4-linkages resistant to α-amylase action (⌣).
O = D-glucopyranose unit - = 1:4-link
↓ = 1:6-link

The usual commercial enzyme preparations do not contain any enzymes capable of breaking the obstructive 1 : 6-link, other than as an impurity, and special steps have to be taken in order to hydrolyse starch completely to simple sugars. Such enzymes have been obtained from *Aspergillus niger*, *Cl. acetobutylicum* and the R-enzyme of Peat. The first two can only hydrolyse terminal linkages at the non-reducing chain end, liberating glucose, to which a linear substrate is completely converted. R-enzyme is

purely a de-branching enzyme, being able to hydrolyse non-terminal 1 : 6-linkages. It will be seen that the action of this enzyme is to remove the obstruction which halts the action of α- and β-amylases and that the combined use of these enzymes converts starch completely to simple sugars. The existence of two further enzymes should be mentioned. These are the Z-enzyme and limit dextrinase. The former has been isolated from the soya bean and its action is very similar to the enzyme emulsion obtained from almonds. Its special property of hydrolysing β-linkages has been of much use in the elucidation of the structure of amylose. As mentioned earlier, it has been known for some years that the "linear" component of starch is slightly branched, and it was found that these branches are severed from the main chain by Z-enzyme. It thus appears as if starch (*i.e.* amylose) contained a small proportion of β-linkages, which are known to be the only linkage in cellulose. Nothing is known concerning the synthesis of this anomalous link of starch within the plant. The other enzyme to be mentioned is limit dextrinase, which has been isolated from barley malts. It acts on the branch linkages in amylopectin (and its limit dextrins), but little else concerning the mode of action is known.

Both α- and β-amylases are commercially available for conversions of starch in the food, textile and adhesive trades. The α-amylase *Bacterase* (Norman Evans and Rais Ltd.), of bacterial origin, is widely used for the liquefaction of flours and starches in the manufacture of syrups and ice creams. If syrups of increased sweetness are required, a second conversion with a β-amylase, usually obtained from malt extract (diastase), is necessary.

α-Amylases of fungal origin are sometimes used for de-starching fruit juices in the manufacture of pectin, and a commercial preparation is marketed under the name of *Amylozyme*.

Fungal amylases have found great interest in the baking of bread in the U.S.A., the enzymes being obtained by growing the mould *Aspergillus oryzæ* on a solid medium and extracting with water. Addition of small amounts to the dough results in (1) greater stiffness of dough, (2) increased volume of the loaf, (3) improved crumb properties and (4) improved appearance of the loaf. Reference should be made to a review recently published by Amos.[3]

★ *In the second part of his article, Dr. Dux will discuss developments in analysis, discoloration of food products containing starch, staling of bread, texture of blancmanges, and cold water-soluble pudding powders.*

Acknowledgments

I gratefully acknowledge the help of the following firms for giving me certain data of their machines and for allowing me to reproduce diagrams: the Alfa-Laval Co., London; K. Kroyer, Aarhuis, Denmark; Norman Evans and Rais, Manchester; the Dorr-Oliver Co. Ltd., London.

REFERENCES

1 *Fortschritte der Chemie organischer Naturstoffe*, 1954. Springer Verlag (in English).
2 Kroyer, *Stärke*, 1954, **6**, 119, and B.P. 715,425.
3 A. J. Amos, *J. Sci. Food Agric.*, 1955, **6**, 480.

Yeast from the Sea

SEAWEED extracts and carbon-rich compounds isolated from seaweed have been successfully used as media or media supplements for the cultivation of 46 strains of yeast. Describing his experiments (*Jnl. Sci. Food Agric.*, 1955, **6**, 10, 611), E. O. Norris reports that in general extracts from *Laminaria cloustoni* (frond) afforded the most suitable media, and *Candida krusei*, *Candida solani*, *Nadsonia fulvescens*, *Pichia membranæfaciens* and *Oospora lactis* were the most prolific yeasts. Aeration of the cultures increased the yield, but no appreciable increase was obtained when yeasts were cultivated in media prepared from seaweed treated with 0·1 and 1·0 N-hydrochloric acid.

Food of the Future

IT is a pity, grumbled an M.P. recently, that the authors of best-selling futuristic science fiction do not spend some of their time helping to popularise present-day achievements in science.

We think the hon. gentleman is over-pessimistic. Books and articles on popular science have almost as many devotees as those on science fiction and, bearing in mind the danger of a little knowledge, require far more responsible treatment. In fact the latest of these works to be published on food* has had many predecessors, some of them by distinguished authorities. However, Dr. Cook differs slightly from his forerunners in that he takes the problems as read and sets out to show what science is doing about them.

The main danger of presenting science to the man in the street is that it is over-simplified to such an extent that further research or reading may be thought unnecessary. Dr. Cook has not entirely avoided this pitfall. Even if a full bibliography was considered too much, a list of suggested books for further reading would have been valuable, while some of the chapter headings, such as "When Plants go Sick" and "Animals are Important," may not please the more serious minded.

Dr. Cook's method is to describe the main steps of food production and processing and to state the problems present, giving a historical survey of the means used to overcome them, with a brief account of current developments and future possibilities. The last three chapters deal with foods from algæ, fish farming and the prospect of synthetic foods. The provision of protein from yeast, hydroponic algæ culture and synthetic fats from petroleum chemicals are among the changes envisaged.

The book is well written after its style and should stimulate further thought if not further reading. It is well illustrated.

* *The Fight for Food*. By J. Gordon Cook, PH.D., F.R.I.C. Harrap, 1955. Pp. 208. Illustrated. 10s. 6d. net.

Why Cooked Potatoes Blacken

By Harold G. Wager

(Low Temperature Station for Research in Biochemistry and Biophysics, University of Cambridge and Department of Scientific and Industrial Research)

The tendency of potatoes to blacken during preparation and cooking is a well-known defect which has caused a good deal of comment in recent years. This article briefly describes the fundamental causes of such blackening, and some of the attempts to prevent it.

THE colour of good quality cooked potatoes varies from a pale creamy white to pale yellow. The amount of yellow pigment depends mainly on the variety, but the soil and climatic conditions of growth also affect it. In such good quality cooked potato there should be no trace of grey discoloration when hot or cold. Many samples of potatoes, however, show some grey discoloration and there are several quite distinct causes for this.

The first of these causes to mention is perhaps the least important, since it is avoidable, and arises from the fact that if potatoes are peeled and then allowed to stand raw in air for any length of time before cooking a pinkish discoloration occurs which slowly darkens to grey and which in any case becomes grey on cooking. This is no problem to the domestic consumer but may cause trouble when potatoes are used in manufacturing processes. The cause of this discoloration is the oxidative enzymic formation of the compound melanin. Its formation can be stopped either by inactivation of the enzymes (*e.g.* by heat) or by preventing access of oxygen to the tissues, and it only occurs in dead or damaged cells; so that allowing the potatoes to stand under water, where the oxygen content is likely to be low, is an effective cure, and even thorough washing of the peeled potato, which removes damaged cell contents, results in a great improvement. Different stocks of potatoes vary in their susceptibility to this trouble.

The same enzyme system may be caused to function by damaging the raw potato tissues in other ways, of which the commonest is bruising during lifting and handling.[1] Such bruising is shown by parts of the flesh of the tuber being bluish grey; these blue patches are usually near the surface and become grey after cooking. Potatoes vary in their liability to this type of damage and it has been shown that it is influenced by growth conditions such as soil, fertiliser treatment, especially the available potash, and by variety. A similar type of discoloration is brought about by other causes of cell damage such as fungal disease, *e.g.* the brownish-grey colour of patches of the tubers due to potato blight, or by attack by insects or worms or by lye peeling of potatoes, but of course these types of discoloration can be seen before cooking and therefore can be removed, though this may result in considerable wastage.

Stem-end blackening

There is a further type of grey discoloration which is more serious. It does not show in the raw potato nor usually in the hot cooked potato but develops during cooling. This grey discoloration is only found towards the end of the potato where the attachment to the parent plant occurred—the stem-end—and is known as stem-end blackening of potatoes. There is no flavour associated with the colour but it is very unsightly and leads to wastage of domestic potatoes, while it may be a serious problem commercially. For instance, during the war, when large quantities of potatoes were dehydrated, it was found that a rather appreciable proportion of the stocks used gave rise to a grey and unappetising dried product which usually became worse on cooking. Stem-end blackening is difficult to deal with because it is very variable in incidence and does not show in the raw tuber.

A considerable amount of work has been done on the stem-end blackening of potatoes, both from the agricultural and chemical aspects, in the hopes of finding a cure or at least some way of avoiding it. The incidence of stem-end blackening varies in different countries and in different periods. Much was heard of it during the war and it seems rather less serious now. A partial explanation of this may be that the extra land used for potato cultivation during the war was unsuitable in some way and resulted in a poor quality product, whereas now, with less demand, potatoes are once again being grown mainly on good potato land. In the United Kingdom there is, at the moment, an increase of interest in this problem, as the domestic consumer appears to be becoming more conscious of potato quality.

Before considering what has been found out about the stem-end blackening of potatoes it should be emphasised that the pigment is not melanin which was concerned in the other forms of greying of potatoes, and for this reason a sharp distinction must be made between stem-end blackening and other forms of greying of potatoes.

Agricultural treatments

Many experiments have been carried out during the last fifty years to try and determine the effect of different agricultural conditions on the liability of potatoes to stem-end blackening but unfortunately the results are not clear cut. The difficulty is that it never seems possible to get a really repeatable result. This may be illustrated by considering the differences between varieties.

Some stocks of all varieties will be found to be of first class colour, whilst others of the same varieties go grey after cooking. This is even true if the stocks are removed from rather similar soils in a restricted area, such as, for instance, East Anglia, when climatic conditions do not fluctuate widely. If, however, a number of stocks of potatoes are collected and an average greyness calculated for each variety, these averages will be found to differ significantly. In considering such a figure and when saying that one variety is worse than another it must always be remembered that individual stocks of any variety may be good or bad. Such a situation, clearly, makes the determination of the effect of agricultural treatments difficult and also very laborious because the results have to be statistical.

Variety influences the average stem-end blackening perhaps more than any other single factor, and next in importance is the group of factors which may be classed as the locality-soil-complex. This, again, is a statistical conclusion and the soil factors have not been separated from those of locality (which, of course, include climate). The complexity of the effect of the soil-locality on the development of blackening may be illustrated by the following experiment. Soil of "black fen" type, from a field which gave rise to blackening potatoes, was used for the growth of potatoes in large pots. The plants grew well and surprisingly enough the potatoes produced blackened only very little and did not differ significantly from those grown as controls under similar conditions in a good garden soil, yet in the same season the potatoes grown in the field only 10 miles away from which the soil was removed proved to blacken severely. Conditions in pots are always different from those in fields but such an experiment does seem to rule out soil as being by itself a major factor and raises the interesting physiological question of how the soil-locality is reacting on the growing potato plant to make it produce blackening tubers. It would seem that small differences in the soil-locality must be important as regards the amount of blackening produced. There is no doubt, however, that certain soil types do give, on the average, worse potatoes than others; for instance, in England black fen type soils are worse than silt lands.[2] It must be remembered that all the English fen soils come from a relatively restricted area and may have certain climatic features in common so that such result also is not proof that it is the soil in the soil-locality complex which is important.

Fertilisers

Much work has been done on the effect of fertilisers on the liability of potatoes to stem-end blackening and the conclusions reached are very conflicting. It is generally agreed that phosphate has no effect, but very variable results have been obtained with regard to the effect of potash. Some workers have found that a low level of potash in the soil, especially when combined with a high level of nitrogen, leads to blackening, but others have failed to confirm this. At the best, increasing the potash content of the soil leads to a certain improvement in the colour, but, as for instance on the fen soil referred to earlier,[3] no level of potash tested gave enough improvement to give other than poor quality blackening potatoes. Thus even when there appears to be an effect of increasing the potash status of a soil it is not a cure for stem-end blackening.

In a recent paper, the American workers Tottingham, Ross, Marek and Claggett[4] summarise some nine years' work by saying, "Diverse fertiliser treatments on different soils including the use of both macro and micro elements gave little consistent alleviation of blackening. . . . Frequently a high level of K decreased blackening noticeably but this response was not uniform even within an experiment. . . . To attribute any specific action to K or any other nutrient element in controlling blackening is unjustified by the data so far accumulated." Thus the situation seems to be that given certain unknown conditions the interaction of the potato with the soil-locality factors *may* result in less blackening if the potash status of the soil is improved, but the effect is small and unpredictable.

That climate has an effect on blackening is shown by the seasonal variations that occur in the average blackening of a variety.[2] This is, once again, a statistical conclusion and it is not known which elements of the climate are responsible for the effect.

The fact that varieties differ in their proneness to stem-end blackening would suggest that the liability is genetically controlled and this conclusion has been demonstrated by breeding trials.[5]

This consideration of some of the agricultural factors that influence stem-end blackening may be summed up by saying that none of those factors so far considered are overriding in the sense of either curing the complaint or of producing it. All the factors seem to be acting as modifying agents on a pre-existing tendency to discolour.

The blackening pigment

The chemical properties of the stem-end blackening pigment have been to some extent determined, but its chemical nature is still uncertain. The pigment changes colour as the *p*H is changed; below a *p*H of 5·8-6·0 it is almost colourless, perhaps faintly yellow-green, and as the *p*H is increased the typical grey colour appears and by a *p*H of 7 its intensity is considerable.[6] With further increase in *p*H the pigment takes on a more violet tinge and the colour maximum is reached between *p*H 8-9. Now the *p*H of cooked potato tissue varies from as low as 5·7 up to 6·5 and therefore the *p*H of a tuber is a matter of great importance as far as the colour intensity shown by the stem-end blackening pigment is concerned. This is the basis of the traditional method of decreasing blackening by cooking the potatoes with either a little lemon juice or a little vinegar. In commercial processing the *p*H can

often be controlled at about 5·8-6·0, at which value only very exceptional stocks will show more than a trace of discoloration. It is unsafe to reduce the *p*H much below this because the texture worsens rather rapidly, although the flavour will not be affected until a *p*H of 4·5-5·0 is reached.

The stem-end blackening pigment shows its normal grey colour when in the oxidised state and is colourless or nearly so when reduced.[7] The change is reversible, but strong reducing agents are required to reduce the pigment, while oxidation is brought about rapidly by atmospheric oxygen. A change in the state of oxidation seems to be the reason why a hot cooked potato is of good colour which worsens on cooling. In the hot cooked potato there will be little or no free oxygen and a considerable reducing potential, but as the potato cools,oxygen slowly penetrates and the activity of the reducing systems fall, with the result that the stem-end blackening pigment changes to the coloured oxidised form. No use can be made of this property for control of the colour of cooked potatoes because it would be impractical to maintain the tissues under sufficiently strong reducing conditions whilst being consumed.

A rather important finding from a commercial point of view is that the grey pigment is a compound of a colourless material combined with iron.[8] The combination occurs readily in solution and is reversible. There is normally in potatoes more of the colourless precursor than of available iron to combine with it, with the result that any contamination of the potatoes with iron during handling leads to a worsening of the colour.

Both citrate and phosphate reduce the colour of the iron precursor complex,[9] presumably by competing for the available iron. This is of more importance than might appear since there is a rather appreciable and also a variable amount of citrate in potato tissue. The phosphate content, too, will vary with the manurial status. Neither of these salts can be used as a control method since their effect is too small; they should be regarded as naturally-occurring materials which modify the colour and so lead to complex relationships between growth conditions and colour intensity.

As has been described, the precursor of the stem-end blackening pigment combines with iron to give a compound which when oxidised is coloured violet at high *p*H and yellowish green at low *p*H and which is yellowish green when reduced. Such reactions are also given by *o*-diphenol groupings. Furthermore, borate which combines rather strongly with adjacent hydroxyl groups reduces the colour of the stem-end blackening pigment and of *o*-diphenol iron complexes.[9, 10] This similarity of behaviour has led to the suggestion that the precursor of the stem-end blackening pigment contains an *o*-diphenol group. This is a very possible hypothesis but direct proof is still lacking.

It is worth while considering why the raw tuber shows no colour. There can be no certainty about this at present but a suggestion can be made. In living cells there is evidence that there is normally a very low content of free ferric or ferrous ions, all of which seem to be combined in some way with the protoplasm. Furthermore, living cells are normally in a state where there is a strong tendency to reduction, with the result that even if there is some of the precursor combined with iron it will be in a reduced state and, therefore, nearly colourless. Cooking, then, would seem to serve two main functions: it destroys the enzymes which maintain the reducing conditions, and also frees ferric or ferrous ions from protoplasmic combination with the result that the precursor iron complex can be formed and can then be oxidised by atmospheric oxygen.

Much still unknown

In spite of a considerable amount of work there remains much to find out about the stem-end blackening pigment. It would seem that potatoes have a liability to contain a precursor (perhaps an *o*-diphenol) and a certain amount of free iron salts, at any rate after cooking, which, of course, combine to give the coloured pigment. The colour will clearly depend on the content of precursor and of iron and it is modified by the *p*H of the tissue and by the content of organic and phosphoric acids, etc. All of these are influenced differently by the conditions of growth, *i.e.* soil, climate, fertiliser and variety. As a result of such a complex interacting system the absence of a clear and repeatable response to any one change in the environmental conditions need not be regarded as surprising. The incidence of the complaint can be lessened by only growing potatoes on good potato land and by using varieties which blacken little, but a final solution must lie with the potato breeder. The complaint is inherited and does not seem to be linked to any desirable feature, and so by the selection of new varieties which do not blacken it may ultimately be eliminated.

This paper was prepared as part of the programme of the Food Investigation Organisation of the Department of Scientific and Industrial Research.

Crown Copyright Reserved.

REFERENCES

1. E. G. Mulder. *Plant and Soil*, 1949, **2**, 59.
2. H. G. Wager. *J. Agric. Sci.*, 1946, **36**, 215.
3. A. Pollard, M. E. Kieser, A. Crang, and T. Wallace. Ann. Rep. Long Ashton Expt. Sta., 1949, 18.
4. W. E. Tottingham, R. Nagy, A. F. Ross, J. W. Marek, and C. O. Claggett. *J. Agric. Res.*, 1947, **74**, 145.
5. G. H. Rieman, W. E. Tottingham, and J. S. McFarlane. *Ibid.*, 1944, **69**, 21.
6. H. G. Wager. *Biochem. J.*, 1945, **39**, 482.
7. O. Smith, L. B. Nash, and A. L. Dittman. *American Potato J.*, 1942, **19**, 229.
8. H. G. Wager. *Biochem. J.*, 1948, **43**, 318.
9. F. Juul. Studier over kartoflens mørkfarvning efter kogning, 1949, Jul. Gjellerups Forlag København.
10. F. Bowman and F. Hanning. *J. Agric. Res.*, 1949, **78**, 627.

New and revised publications have been issued by Sturtevant Engineering Co. Ltd., describing their *Uniclone* dust collector, designed primarily for individual machines where a composite plant is impracticable, rotary piston blowers for use against resistances beyond the scope of centrifugal blowers, their *Precipitron* electrostatic air filter and their exhaust ventilation systems. The last includes details of steam removal from boiling pans in confectionery works and preserves factories and the removal of fumes and vapours from baking ovens.

Some stocks of all varieties will be found to be of first class colour, whilst others of the same varieties go grey after cooking. This is even true if the stocks are removed from rather similar soils in a restricted area, such as, for instance, East Anglia, when climatic conditions do not fluctuate widely. If, however, a number of stocks of potatoes are collected and an average greyness calculated for each variety, these averages will be found to differ significantly. In considering such a figure and when saying that one variety is worse than another it must always be remembered that individual stocks of any variety may be good or bad. Such a situation, clearly, makes the determination of the effect of agricultural treatments difficult and also very laborious because the results have to be statistical.

Variety influences the average stem-end blackening perhaps more than any other single factor, and next in importance is the group of factors which may be classed as the locality-soil-complex. This, again, is a statistical conclusion and the soil factors have not been separated from those of locality (which, of course, include climate). The complexity of the effect of the soil-locality on the development of blackening may be illustrated by the following experiment. Soil of "black fen" type, from a field which gave rise to blackening potatoes, was used for the growth of potatoes in large pots. The plants grew well and surprisingly enough the potatoes produced blackened only very little and did not differ significantly from those grown as controls under similar conditions in a good garden soil, yet in the same season the potatoes grown in the field only 10 miles away from which the soil was removed proved to blacken severely. Conditions in pots are always different from those in fields but such an experiment does seem to rule out soil as being by itself a major factor and raises the interesting physiological question of how the soil-locality is reacting on the growing potato plant to make it produce blackening tubers. It would seem that small differences in the soil-locality must be important as regards the amount of blackening produced. There is no doubt, however, that certain soil types do give, on the average, worse potatoes than others; for instance, in England black fen type soils are worse than silt lands.[2] It must be remembered that all the English fen soils come from a relatively restricted area and may have certain climatic features in common so that such result also is not proof that it is the soil in the soil-locality complex which is important.

Fertilisers

Much work has been done on the effect of fertilisers on the liability of potatoes to stem-end blackening and the conclusions reached are very conflicting. It is generally agreed that phosphate has no effect, but very variable results have been obtained with regard to the effect of potash. Some workers have found that a low level of potash in the soil, especially when combined with a high level of nitrogen, leads to blackening, but others have failed to confirm this. At the best, increasing the potash content of the soil leads to a certain improvement in the colour, but, as for instance on the fen soil referred to earlier,[3] no level of potash tested gave enough improvement to give other than poor quality blackening potatoes. Thus even when there appears to be an effect of increasing the potash status of a soil it is not a cure for stem-end blackening.

In a recent paper, the American workers Tottingham, Ross, Marek and Claggett[4] summarise some nine years' work by saying, "Diverse fertiliser treatments on different soils including the use of both macro and micro elements gave little consistent alleviation of blackening. . . . Frequently a high level of K decreased blackening noticeably but this response was not uniform even within an experiment. . . . To attribute any specific action to K or any other nutrient element in controlling blackening is unjustified by the data so far accumulated." Thus the situation seems to be that given certain unknown conditions the interaction of the potato with the soil-locality factors *may* result in less blackening if the potash status of the soil is improved, but the effect is small and unpredictable.

That climate has an effect on blackening is shown by the seasonal variations that occur in the average blackening of a variety.[2] This is, once again, a statistical conclusion and it is not known which elements of the climate are responsible for the effect.

The fact that varieties differ in their proneness to stem-end blackening would suggest that the liability is genetically controlled and this conclusion has been demonstrated by breeding trials.[5]

This consideration of some of the agricultural factors that influence stem-end blackening may be summed up by saying that none of those factors so far considered are overriding in the sense of either curing the complaint or of producing it. All the factors seem to be acting as modifying agents on a pre-existing tendency to discolour.

The blackening pigment

The chemical properties of the stem-end blackening pigment have been to some extent determined, but its chemical nature is still uncertain. The pigment changes colour as the *p*H is changed; below a *p*H of 5·8-6·0 it is almost colourless, perhaps faintly yellow-green, and as the *p*H is increased the typical grey colour appears and by a *p*H of 7 its intensity is considerable.[6] With further increase in *p*H the pigment takes on a more violet tinge and the colour maximum is reached between *p*H 8-9. Now the *p*H of cooked potato tissue varies from as low as 5·7 up to 6·5 and therefore the *p*H of a tuber is a matter of great importance as far as the colour intensity shown by the stem-end blackening pigment is concerned. This is the basis of the traditional method of decreasing blackening by cooking the potatoes with either a little lemon juice or a little vinegar. In commercial processing the *p*H can

often be controlled at about 5·8-6·0, at which value only very exceptional stocks will show more than a trace of discoloration. It is unsafe to reduce the *p*H much below this because the texture worsens rather rapidly, although the flavour will not be affected until a *p*H of 4·5-5·0 is reached.

The stem-end blackening pigment shows its normal grey colour when in the oxidised state and is colourless or nearly so when reduced.[7] The change is reversible, but strong reducing agents are required to reduce the pigment, while oxidation is brought about rapidly by atmospheric oxygen. A change in the state of oxidation seems to be the reason why a hot cooked potato is of good colour which worsens on cooling. In the hot cooked potato there will be little or no free oxygen and a considerable reducing potential, but as the potato cools,oxygen slowly penetrates and the activity of the reducing systems fall, with the result that the stem-end blackening pigment changes to the coloured oxidised form. No use can be made of this property for control of the colour of cooked potatoes because it would be impractical to maintain the tissues under sufficiently strong reducing conditions whilst being consumed.

A rather important finding from a commercial point of view is that the grey pigment is a compound of a colourless material combined with iron.[8] The combination occurs readily in solution and is reversible. There is normally in potatoes more of the colourless precursor than of available iron to combine with it, with the result that any contamination of the potatoes with iron during handling leads to a worsening of the colour.

Both citrate and phosphate reduce the colour of the iron precursor complex,[9] presumably by competing for the available iron. This is of more importance than might appear since there is a rather appreciable and also a variable amount of citrate in potato tissue. The phosphate content, too, will vary with the manurial status. Neither of these salts can be used as a control method since their effect is too small; they should be regarded as naturally-occurring materials which modify the colour and so lead to complex relationships between growth conditions and colour intensity.

As has been described, the precursor of the stem-end blackening pigment combines with iron to give a compound which when oxidised is coloured violet at high *p*H and yellowish green at low *p*H and which is yellowish green when reduced. Such reactions are also given by *o*-diphenol groupings. Furthermore, borate which combines rather strongly with adjacent hydroxyl groups reduces the colour of the stem-end blackening pigment and of *o*-diphenol iron complexes.[9, 10] This similarity of behaviour has led to the suggestion that the precursor of the stem-end blackening pigment contains an *o*-diphenol group. This is a very possible hypothesis but direct proof is still lacking.

It is worth while considering why the raw tuber shows no colour. There can be no certainty about this at present but a suggestion can be made. In living cells there is evidence that there is normally a very low content of free ferric or ferrous ions, all of which seem to be combined in some way with the protoplasm. Furthermore, living cells are normally in a state where there is a strong tendency to reduction, with the result that even if there is some of the precursor combined with iron it will be in a reduced state and, therefore, nearly colourless. Cooking, then, would seem to serve two main functions: it destroys the enzymes which maintain the reducing conditions, and also frees ferric or ferrous ions from protoplasmic combination with the result that the precursor iron complex can be formed and can then be oxidised by atmospheric oxygen.

Much still unknown

In spite of a considerable amount of work there remains much to find out about the stem-end blackening pigment. It would seem that potatoes have a liability to contain a precursor (perhaps an *o*-diphenol) and a certain amount of free iron salts, at any rate after cooking, which, of course, combine to give the coloured pigment. The colour will clearly depend on the content of precursor and of iron and it is modified by the *p*H of the tissue and by the content of organic and phosphoric acids, etc. All of these are influenced differently by the conditions of growth, *i.e.* soil, climate, fertiliser and variety. As a result of such a complex interacting system the absence of a clear and repeatable response to any one change in the environmental conditions need not be regarded as surprising. The incidence of the complaint can be lessened by only growing potatoes on good potato land and by using varieties which blacken little, but a final solution must lie with the potato breeder. The complaint is inherited and does not seem to be linked to any desirable feature, and so by the selection of new varieties which do not blacken it may ultimately be eliminated.

This paper was prepared as part of the programme of the Food Investigation Organisation of the Department of Scientific and Industrial Research.

Crown Copyright Reserved.

REFERENCES

1. E. G. Mulder. *Plant and Soil*, 1949, **2**, 59.
2. H. G. Wager. *J. Agric. Sci.*, 1946, **36**, 215.
3. A. Pollard, M. E. Kieser, A. Crang, and T. Wallace. Ann. Rep. Long Ashton Expt. Sta., 1949, 18.
4. W. E. Tottingham, R. Nagy, A. F. Ross, J. W. Marek, and C. O. Claggett. *J. Agric. Res.*, 1947, **74**, 145.
5. G. H. Rieman, W. E. Tottingham, and J. S. McFarlane. *Ibid.*, 1944, **69**, 21.
6. H. G. Wager. *Biochem. J.*, 1945, **39**, 482.
7. O. Smith, L. B. Nash, and A. L. Dittman. *American Potato J.*, 1942, **19**, 229.
8. H. G. Wager. *Biochem. J.*, 1948, **43**, 318.
9. F. Juul. Studier over kartoflens mørkfarvning efter kogning, 1949, Jul. Gjellerups Forlag København.
10. F. Bowman and F. Hanning. *J. Agric. Res.*, 1949, **78**, 627.

New and revised publications have been issued by Sturtevant Engineering Co. Ltd., describing their *Uniclone* dust collector, designed primarily for individual machines where a composite plant is impracticable, rotary piston blowers for use against resistances beyond the scope of centrifugal blowers, their *Precipitron* electrostatic air filter and their exhaust ventilation systems. The last includes details of steam removal from boiling pans in confectionery works and preserves factories and the removal of fumes and vapours from baking ovens.

Raising the Status of Canned Vegetables

Belgium's Research Station

INACOL—the Belgian research station for vegetable canning—is one of the youngest organisations of its kind, having been formed only since the war. Already, however, it has markedly influenced the country's canning industry and agriculture. Some of its achievements are mentioned in the following description of the laboratories and facilities at Wezembeek-Oppem, near Brussels.

THE Institut National pour l'Amelioration des Conserves de Legumes (literally the National Institute for the Improvement of Vegetable Canning), popularly known as INACOL, was established after the second World War. Its foundation gave expression to the opinion of many Belgian canners that to raise the consumption of canned goods they would have to help raise the standard of living in Belgium. The problems of price and prejudice had to be overcome, and the industry recognised that they would have to make full use of modern mechanised methods to lower the costs of their products, while making every effort to raise the quality of canned goods. To meet the high standards demanded by Belgian housewives special varieties of vegetables had to be raised on a larger scale, while every new development in the control of colour and taste of canned fruits and vegetables had to be exploited.

As a first step, M. Jean Wittouck, the energetic head of the canning association and the president of Belgium's largest canning company, paid visits to the Fruit and Vegetable Canning and Quick Freezing Research Association at Chipping Campden, to the National Canners' Association in the United States and to several private laboratories in France. The visits convinced him that to improve the status of canned vegetables in Belgium, a great deal of research would have to be done on the agricultural as well as on the technical side. Accordingly he organised the formation of the new research station, with the support of nearly every canner in the country, and placed it under the direction of Prof. Lecrenier, formerly of the Agricultural College of Gembloux and a leading authority on vegetables. The aim of the Institute was to solve all those problems of the industry which individual canners could not tackle for themselves because of lack of time, special training or material, and to carry out agricultural research from sowing to harvesting; technical work on quality and factory control would be carried out in the laboratory and pilot plant. Meetings were held where canners put forward their problems to the new Institute.

Reminiscent of a large old Flemish farm, the new building at Wezembeek-Oppem, near Brussels, attracts numerous visitors from abroad. One wing of the building is occupied by laboratories and the other by offices and the library.

New building erected

The Institute began on a small scale, but under the inspiration of the dynamic impulse of the chairman M. Wittouck, a large building was erected close to Brussels at Wezembeek-Oppem, architecturally reminiscent of an old Flemish farm. Today ten graduates work at INACOL under the leadership of M. Louis de Faestraets, a specialist in genetics who has studied in the U.S. and Sweden. In the agricultural service an agricultural engineer and a technician work with the farm labourers. Three engineers work in the laboratories, one of them, M. P. H. Lefebvre, having been trained at Chipping Campden and Stavanger. At first INACOL was supported entirely by voluntary contributions but it was later assisted by the Belgian Fund to Promote Research (I.R.S.I.A.).

Breeding research

Most of the agricultural work at INACOL is devoted to the breeding of new varieties of vegetables. Harvesting methods have been changed and farm labour mechanised. This is especially true of peas, which were once raised in gardens and are now cultivated on large farms. The peas growing in INACOL'S trial grounds consist of 4 acres of 2,000 varieties of hybrids, all of which are tested for their agricultural and canning value.

INACOL has also played an important part in the development of insecticides against beetles and aphids attacking peas and beans. Experiments have been made on fungicides for seed treatment and crop protection and the Institute

has pioneered the promotion of selective herbicides for peas. Since 1950 most of the pea fields have been controlled with D.N.C. and carrots are also treated with selective herbicides. Experiments are now taking place to find a satisfactory herbicide for beans and spinach. Methods to raise production by modifying the density of sowing have been devised and demonstrated to farmers. A co-operative company has been founded to raise seeds for canners, thus serving the industry by lowering the price of basic products.

Laboratory work

Laboratory work at INACOL consists of the investigation of specific problems put to the Institute by its members, and of research on new theories and production methods. Analyses are carried out on canned products sent to the laboratory by individual firms.

Thus, besides the normal analytical work carried out by food chemists, biochemical research plays an important part in the laboratory. So far, INACOL has been successful in improving the colour of spinach and the texture of peas. The difficulty of keeping salsifies and celeries white after sterilisation has also been overcome.

The laboratory wing is divided into laboratories specialising in botany, microbiology, chemistry and physics, together with a small photographic laboratory. All are equipped with the usual services and have ancillary offices. Thus the chemical laboratory has a special room for fume control and a separate balance room. Besides the normal laboratory equipment it has a spectrophotometer for the analysis of metals or trace elements, a colorimeter, a refractometer used mainly to control the sugar contents of tomatoes and a penetrometer to measure the thickness of pastes and purées. The microbiological laboratory, furnished with stainless steel benches and tables, is located close to a room for the preparation of culture media. Leading off from it are a dark room with an Ortolux Leitz microscope and a room for inoculation with special aeration, fitted with ultra-violet lamps to avoid airborne infection of the material under test. The department is equipped with incubators, centrifugal machines and a constant temperature oil bath.

Stainless steel laboratory furniture is used throughout this microbiological laboratory at Wezembeek-Oppem. Note the ancillary rooms leading off the main laboratory for the preparation of culture media, etc.

A great deal of help is given to INACOL members by its library. In addition to the documentation and information work normally carried out by libraries in research institutes, reports on individual products are written for canners who ask for information for advertising purposes.

Contact is maintained with the medical profession, who are kept informed of the Institute's research and findings, *e.g.* on the high vitamin C content of canned vegetables.

Pilot plant

However, the real centre of INACOL—the place where agronomy, chemistry and microbiology gather and where science and technology meet—is the pilot plant. Laboratory tests can be controlled to simulate actual production processes. The pilot plant is equipped with all the apparatus of a full-scale cannery, including cooking kettles, sieves, sealing machines, a small huller for fresh peas and a tenderometer. Besides two large retorts, there is a battery of four small retorts, so that times may be modified without altering the processing temperature. It is through the pilot plant that the problems of the practical man are communicated to the scientist who provides the research that INACOL hope will help improve vegetable canning in Belgium and throughout the world.

Bread made with *Vykamol* polyglycol stearate has been found to be at least as soft after three days as bread made in the ordinary way after one day, claim C. M. Keyworth and Co. Ltd., in one of their leaflets setting out the advantages of *Vykamol* polyglycol stearate and glyceryl monostearate for the bakery industry. Recommendations are made for the use of both substances in bread, fermented goods, cakes and sponges, ice creams, cooking fats and shortenings and foodstuffs in general.

Bottled Mineral Waters in Italy

NOTES BY A CRITICAL TOURIST

CONSUMPTION of bottled mineral waters—chiefly from slightly warm springs of mildly volcanic areas—is widespread in Italy. The waters are drunk at table at home and in restaurants, on journeys, at the seaside, and elsewhere. The usual size of bottle is a litre; half-litres can sometimes be obtained at a slight extra cost. Though all bottlers claim medicinal values for their products, the waters appear to be consumed mainly for pleasure and as a matter of taste—often as a substitute for wine at a restaurant, for example: the hotelier is pleased to accept an order for mineral water instead of wine to accompany the meal. Some of the more famous brands are sold both plain and made up into flavoured drinks such as *aranciata* (orangeade; with fruit pulp) or the bitter drink known as *chinotto*. In spite of the popularity of *aranciata* and more sophisticated soft and other beverages prepared with mineral and ordinary water, it is probable that the great bulk of mineral-water sales are of the natural waters themselves, untreated except possibly by addition of CO_2 to restore or gain a slight effervescence.

This large consumption of plain mineral waters continues in spite of the fact that public supplies of piped water are now almost everywhere excellent in Italy, and generally can be, and are, drunk without fear of infection and without special precautions such as boiling. To judge by Rome, where there is a millenial tradition of bringing water by aqueduct to public fountains, Italians are connoisseurs of water; some think there is none so good as that of the comparatively modern Trevi fountain, whilst others prefer the more classical and cool hill water called the Acqua Marcia, running constantly from an open pipe near the Campidoglio. Though this last is not commercialised, it is worth noting that the water is so rich in CO_2 that it appears almost milky-white as it leaves the fountain; but on allowing a glass of it to stand for a moment, it rapidly clears without any sediment—showing that the milkiness is entirely due to dissolved gas.

By "mineral waters" the natural products of springs are meant. Italy has no real equivalent to the range of sweetened, carbonated, and essence-flavoured beverages known to British schoolboys as "pop," and commonly called "mineral waters" or "minerals" in Britain (perhaps because the British Isles have so few mineral springs). Its only representative is the humble *gassosa*, a clear fizzy lemonade, the make of which often verges on anonymity, and which ranks rather low in the hierarchy of Italian drinks; many bars and restaurants do not sell it.

What the labels tell

A correspondent who spent a few weeks this summer touring Italy from the Brenner Pass down to the Ionian Sea amused himself by taking passing note of the variations in the modes of reporting analyses on the labels of bottled mineral waters of Italian origin. Incidentally, this route into Italy may be said to begin with a mineral spring, since barely half a mile on the Italian side of the frontier there is a tiny spa called Brennero Terme adjoining the main road and railway; but whether its waters are bottled our correspondent could not ascertain.

Besides bearing medical testimonials, the labels on the bottles of the plain mineral waters invariably include a long and seemingly detailed analytical report of the chemical and physical characters of the water; and some of them add historical notes about the antiquity of the spring from which the waters are derived. At least one of the brands proudly proclaims that its effervescence is wholly due to natural CO_2 (other brands being artificially carbonated or "gassed"). The medical claims seem always to be accompanied by a signed certificate from a doctor; the analyses are also signed by a prominent chemist or doctor. These certificates are not infrequently headed with the name of a university or other learned institution.

There is invariably a certificate of bacteriological purity issued under no less distinguished auspices. These bacteriological analyses are remarkably uniform; all of them are to the effect that the water is bacteriologically pure and that micro-organisms are absent.

The mode and style of stating the chemical and physical data vary considerably. It was pleasing for our correspondent (a chemist) to note that, as with published analyses of Harrogate mineral waters, the system of stating only the radicals or ions, and their quantities, is generally followed; the older system of presenting a reckoning of presumed salts in calculated amounts is practically or quite extinct among Italian bottlers. The analyses vary a little in date, but few are more than 15 years old.

Physico-chemical features

The physico-chemical features call for special attention. Most analyses refer to the osmotic pressure and freezing-point depression—though not necessarily both together; and it may be presumed that the osmotic pressure is calculated from the freezing point. Temperature at the source is almost invariably stated. Some analyses omit to record *p*H, and state merely "alkalinity." On this important matter of *p*H, some analyses are quite up to date, and refer commendably to *attività* (activity) of hydrogen ions, instead of the older "concentration" of hydrogen ions which was the original foundation of the *p*H-notation but which is not now properly taken to be synonymous with *p*H. Other waters which mention *p*H continue to regard it as meaning concentration of hydrogen ions.

Specific conductance or conductivity (*conducibilità*) is reported surprisingly often; but of all the bottled waters seen by our correspondent only two were noted to state both activity of hydrogen ions and conductance: these were *Recoaro* (from the foothills of the Alps near Vicenza) and *Monticchio* (from one of the springs in the slightly volcanic district of Vulture near the other end of the peninsula).

There is a curious circumstance about one of the waters which, our correspondent suggests, may possibly have a little more "body" in it than most of them possess. He writes that, if his geography is correct, this water arises not a thousand miles from catacombs. According to the analysis, the water is relatively high in nitrate, which is one of the more prominent ions quantitatively; so it was disappointing to find no mention of its content of ammonia!

"Blinding with science"

The purposes served or aimed at by giving abstruse but not always complete information in great detail on the labels can only be conjectured. Apparent explicitness may dazzle the average buyer by "blinding him with science"; and may also help to assure him that his health is being adequately looked after from chemical, bacteriological, and therapeutic points of view when a particular water is recommended to him by his doctor. The average buyer is not likely to be critical about the significance of an omission; a delta sign incorporated in a statement of depression of freezing-point is apt to impress him.

The absence from some labels of such information as that about osmotic pressure or *p*H, or ammonia content, and its statement on others, may raise the questions whether Italian doctors are quite sure what sort of information they value about these widely used mineral waters, and how far the medical advisers can interpret the figures which are given.

It seems permissible to wonder how many people do read the labels carefully, and whether the various bottlers ever compare notes so as to see what their rivals are proclaiming, in more or less scientific terms, on the labels. Nevertheless, the small proportion of people who can and do read and interpret the labels may have an importance quite disproportionate to their numbers. It is not too much to say that they have a cultural importance, and that they may be worth cultivating in the interests of national prestige.

Some brands of Italian (and other) mineral waters are widely exported. It may be suggested to the bottlers that if the bottles they send abroad are accompanied by elaborate and portentous analyses on every label, the world is thereby being offered not just the bottle and its contents, but also an indication—which may be fair or false—of the degree of soundness or triviality of physical and chemical sciences in the country of origin.

Though this note is written on the basis of observations made only in Italy, the problem of maintaining scientific accuracy and consistency in published analyses of mineral waters is not confined to that country; yet, one result of this year's observations is to leave the impression that there is room for improvement in Italian physical chemistry—at least that as exemplified in commercially sponsored analyses emanating from high quarters.

So long as sellers of mineral water maintain the custom of putting statements of analyses on the labels they will be in a position which is substantially different from that of most manufacturers of foods and beverages. The virtually unique position and responsibility of mineral-water bottlers can be matched, probably, only by makers of "analysed" fine chemicals for laboratory use.

It is true of all goods that the reputation of the maker or distributor, and of his nation, depend on the quality of the goods themselves. The mineral-water bottlers have an additional and special responsibility: since the scientific reputation of the country of origin can be helped or hindered by the quality, accuracy, and modernity of the analyses published on the labels.

In the peculiarly exacting circumstances of mineral-water selling, this comment applies to the status of both the pure and applied branches of physical and general chemistry. To put the matter in another way, it involves science at both the university and commercial levels: neither the analyst nor the bottler can afford to show the application of science at less than its best.

Bacteria and Milk

RECENT developments in dairy bacteriology have necessitated a fourth edition of what is now almost a standard text,* and Mr. Chalmers has again revised many chapters of his book originally published 20 years ago. For example, the chapter concerned with the routine examination of milk samples has been enlarged to embrace recent research on tests for the keeping quality of milk. Separate chapters have been allocated to the pasteurisation and sterilisation of milk, and the investigations on the phosphatase test and on "in-bottle" pasteurisation have been included. The quaternary ammonium compounds are briefly described in the chapter on detergents and the section dealing with hypochlorites has been enlarged. More attention has been given to the coli-ærogenes group of organisms in view of the work on classification done by the Coliform joint subcommittee of the Society of General Microbiology and the Society of Applied Bacteriology.

The first part of the book deals with the bacteriological control of milk, and consists of three sections in which the routine examination of samples, the determination of the cause of abnormal conditions and the control of dairy plant are discussed. The second part lays down such general principles of bacteriology as are necessary to a full understanding of the first.

* *Bacteria in Relation to the Milk Supply*. By C. H. Chalmers. 4th Edn. Arnold, 1955. Pp. viii + 291. Illustrated. 21s. net.

Milk, Cereals, Fermentation Processes

The following concludes our report of papers presented before the division of agricultural and food chemistry at the 128th meeting of the American Chemical Society. The first part of the report appeared last month.

Dairy Products and By-Products

CONTROL OF GELATION IN EVAPORATED MILK

N. P. Tarassuk and A. F. Tamsma (University of California)

High-temperature short-time (H.T.S.T.) sterilisation is currently the most feasible process for improving the colour and flavour of evaporated milk, but resultant gel formation during storage impedes its adoption. The initial change is a rapid decline of viscosity followed—rarely in regular evaporated milk, and frequently in milk sterilised by H.T.S.T.—by a gradual thickening and formation of gel. It is a gel of denaturated protein—the type formed only under the highly specific conditions brought about by heat denaturation, with respect to the size and asymmetry of protein particles, availability of reactive groups, and interaction of these groups with water in forming the structural network. H.T.S.T. sterilisation treatment, greatly more conducive to gel formation than the more severe heat treatment of conventional sterilisation, implies that the state of milk proteins as affected by heat denaturation passes through an optimum zone for gelation. Greater denaturation than that produced by H.T.S.T. sterilisation is necessary to avoid gelation. This can be accomplished by increasing protein particle concentration—*i.e.*, by preheating concentrated milk.

Data from three separate experiments show that gelation can be controlled by preheating (75° to 90°C.) concentrated milk (up to 40% T.S.), diluting to standard composition (26%), homogenising, and subjecting to H.T.S.T. sterilisation. Optimum preheating conditions (concentration and time and temperature of heating) are to be established.

IONOPHORESIS AND THE DETERMINATION OF WHEY PROTEINS IN SKIM MILK AND WHEY

A. Leviton (Eastern Utilisation Research Branch, U.S. Department of Agriculture)

Ionophoretic patterns obtained with whey, skim milk, and solutions of pure β-lactoglobulin and α-lactalbumin were analysed to see whether or not they lent themselves to quantitative evaluation. It was found that both α-lactalbumin and β-lactoglobulin were adsorbed on filter paper, and consequently zonal concentrations did not conform with actual concentrations. The magnitude of adsorption during ionophoresis was determined under operating conditions, and this was found to be of the same order for α-lactalbumin and β-lactoglobulin.

On this basis, a method was developed in which a precoat of β-lactoglobulin was applied ionophoretically. This was followed by the application of the sample. The precoat saturated the paper with respect to adsorption of both α-lactalbumin and β-lactoglobulin, and it was found that the recovery of α-lactalbumin and β-lactoglobulin from pure solutions containing these singly and in mixtures was quantitative.

The technique was applied to both rennet and casein whey. Three zones were detectable in the ionophoretic patterns, and the concentrations found for β-lactoglobulin, α-lactalbumin, and the protein of the immunoglobulin fraction respectively were: in casein whey—4·2 mg. per ml., 1·3 mg. per ml., and 0·8 mg. per ml., in rennet whey—4·1 mg. per ml., 1·5 mg. per ml., and 1·4 mg. per ml. Patterns obtained with skim milk streaks applied off-centre toward the cathode showed clear-cut resolution between β-lactoglobulin and the casein system of proteins. A β-lactoglobulin content of 0·5% was found in one sample of Jersey skim milk—an unexpectedly high value.

EFFECTS OF HOMOGENISATION PRESSURE ON PHYSICAL PROPERTIES OF MILK

C. H. Whitnah, W. D. Rutz and H. C. Fryer (Kansas State College)

Mixed milk containing 4·0% fat and 13·0% total solids was pasteurised at 62°C. for 30 min. and divided into 20 parts. One part was not homogenised. Nine parts were put through a laboratory homogeniser at pressures ranging from 15 to 300 p.s.i. Ten parts were put through the first stage of a commercial homogeniser at pressures ranging from 300 to 3,500 p.s.i.

Three properties of these 20 parts were studied: fat globule size, length of picture of vibrating jet, and viscosity. Photomicrographs of gelatin dilutions showed greatest change of globule sizes in range 1,000 to 1,500 p.s.i. The lengths of pictures of vibrating jets of aqueous dilutions first decreased and then increased as homogenisation pressures increased. Viscosities decreased for homogenisation pressures in the neighbourhood of 25 p.s.i., and then increased in a manner dependent upon the temperature and the pressure.

The ratios of viscosities measured in two viscometers were nearly independent of either the temperature at which the viscosity was measured or of the homogenisation pressure.

CHANGE OF Ca AND Mg. ION ACTIVITY OF MILK DURING PROCESSING AND STORAGE

A. van Kreveld and G. van Minnen ("Friesland" Co-operative Milk Products Plant, Netherlands)

Several investigators have shown that in raw milk only a small part of the calcium and magnesium is in the form of calcium and magnesium ions. We found that 1/15 of the calcium and 1/6 of the magnesium are in the ionic state. In sterilised evapor-

ated milk these fractions are only 1/60 and 1/20 respectively, and in sweetened condensed milk they are 1/80 and 1/20 respectively. This proves that most of the free calcium and magnesium ions become bound during processing.

Ion activities in sweetened and condensed milk are much lower than in sterilised evaporated milk; this is partly caused by the precipitating action of the sugar during processing and partly by the lesser ionising power of highly concentrated sugar solutions.

Changes in ion activities caused by processing are shown to take place within one or two hr. No further changes occur during storage in the cases investigated up to date.

Baking

EFFECT OF FERMENTATION TIME ON PRE-FERMENTS USED IN BREADMAKING

J. A. Johnson, B. S. Miller, F. Y. Refai and D. Miller (Kansas State College)

Much interest has developed in the use of pre-ferments to replace sponge fermentation in breadmaking. This has created a demand for knowledge concerning the chemical changes that occur. The present investigation deals with the changes in the concentrations of sugars, total acidity, and CO_2 of three different pre-ferments as a function of time.

The utilisation of sugars was followed by chromatographic methods. The types of pre-ferment and sugars affected the rate of sugar utilisation. In the presence of milk or flour, the rate was retarded slightly. Dextrose was utilised in fermentation at slightly greater rates than sucrose. At the end of 5 hr. of fermentation at 30°C., all but 5-17% of the sugars were fermented.

CO_2 production continued for 6 hr. The rate of gas production was slightly greater when milk was used in the pre-ferment. The total gas production, however, was the same for all types of pre-ferment.

The presence of milk prevented large decreases in the *p*H of the pre-ferments, but total acidity was essentially the same for all pre-ferments. Total organic acid production was followed both by direct potentiometric titration of the pre-ferments and by isolation of the acids using ion-exchange resins.

NUTRITIONAL VALUE OF WHITE BREAD SUPPLEMENTED WITH CASEIN

A. Beaty, F. C. Ward, E. Eilertson and W. Rowe (National Dairy Research Laboratories, Inc.)

The increasing emphasis on the need for reduced caloric intake to control body weight is stressing the importance of protein quality as distinct from protein quantity, since the protein requirements on a low calorie diet are almost the same as those on a high calorie diet.

White bread, at the level in the diet suggested by the "Basic 7" nutrition education programme, supplies about one fifth of the recommended daily protein allowance. Unfortunately, the protein of white flour is of relatively low biological value, primarily because of the shortage of certain essential amino acids. Hence, white bread, unless supplemented to supply the missing amino acids, contains protein of a relatively low biological value. Milk protein has been shown to contain an abundance of the amino acids in short supply in wheat protein, and it has been common practice to add non-fat dry milk solids to white bread to improve its nutritional qualities. However, when added at a high enough level to secure the maximum protein supplementation it causes dough handling difficulties in mechanised bakery equipment.

A concentrated milk protein such as casein, used in conjunction with non-fat dry milk solids in bread appears to be an excellent protein supplement. Experiments have shown that a combination of 3% non-fat dry milk solids plus 3·3% casein imparts to bread the same nutritional value as is imparted by 12% non-fat dry milk solids.

Cereals

THE PHYSICAL NATURE OF GLIADIN

J. Holme and D. R. Briggs (University of Minnesota)

Physico-chemical investigations on gliadin have often led to contradictory results. Confusion exists concerning the actual physical nature of this protein preparation. A strong interaction tendency exists between the molecules of gliadin, probably as a result of a hydrogen-bonding tendency between the amide groups of the molecules. This leads to difficulty in obtaining gliadin in a state of molecular dispersion in aqueous systems.

The imposition of a small degree of charge on the gliadin molecules (in acid solution of very low ionic strength or by preferential hydrolysis of a small percentage of the amide groups) or the addition of stronger hydrogen bonding agents than water (urea, acetamide, formamide, and, presumably, alcohol) act to inhibit the intermolecular H-bonding of the protein molecules and promote molecular dispersion. Under those conditions where gliadin is obtained in molecular dispersion, physical measurements with the ultracentrifuge, and by light scattering techniques, indicate that this protein as ordinarily prepared consists, to greater than 90%, of a homogeneous component with a molecular weight of 25,000 to 30,000.

LINES OF ATTACK ON DOUGH CHEMISTRY

J. A. Anderson and I. Hlynka (Grain Research Laboratory, Board of Grain Commissioners for Canada, Winnipeg, Manitoba)

Rheological studies have now yielded a meaningful and coherent account, in reproducible and quantitative terms, of the behaviour of unyeasted doughs. Changes that occur in doughs, with or without "improvers," when they are mixed or otherwise manipulated and during subsequent resting, can be explained by postulating a dynamic three-dimensional polymer network as the main feature of their chemical archi-

tecture. Protein molecules must comprise the main chains, but lipides, and possibly carbohydrates, are also involved. Changes in rheological properties require postulation of the making and breaking of crosslinks; even when dough is in relatively stable condition, the equilibrium is doubtless dynamic. Crosslinking by hydrogen bonding seems most probable, but links of other types, such as disulphide bridges, cannot be excluded.

The key problem is to develop and subsequently to verify the network hypothesis by elucidating the crosslinking. Main lines of attack involve parallel studies of the effects of iodate and bromate on rheological properties, of the rates of disappearance of these "improvers" in the dough, and of the fate of sulphydryl groups during the process. Iodate has an immediate effect, but bromate has a time-dependent effect. Proteases, now widely used in baking, are also useful tools. Additional information is obtained by adjusting temperature, *p*H, and moisture, and by changing the timing and amount of work done on the dough. A comprehensive collection of facts bearing on the problem is gradually being built up, but it would be premature to claim that solution is in sight.

WHEAT DETERIORATION

L. S. Cuendet, C. M. Christensen and W. F. Geddes (University of Minnesota)

Fungi are a dominant factor in the spoilage of wheat stored above about 14·5% moisture. Recently *Aspergillus restrictus*, a member of the *A. glaucus* group, was shown to invade wheat stored in the laboratory at moisture contents of 13·5 to 15% for 16 months. The fungus grew slowly and was prevalent in the germs of commercial samples in which "sick" wheat had developed. Invasion of wheat by moulds during high moisture periods increases the tendency of the wheat to develop germ damage in later storage at as low as 12% moisture.

Early detection of damage and storage under anærobic conditions are two possible means of limiting mould damage. Decrease in viability is the first detectable change in the deterioration of wheat. A simple colorimetric method for determining dehydrogenase activity, based upon the reduction of triphenyltetrazolium chloride to formazan, has been developed. Unfortunately, the relationship between viability and absorbance has been found to vary with variety, environment and degree of mould infestation.

CO_2 concentrations of 12% and above caused marked inhibition of respiration, of mould growth, and of the development of fat acidity in wheat respiring at 18% moisture in the presence of 21% oxygen. In contrast, decreases in oxygen tension (no CO_2 present) resulted only in a gradual decrease in respiration and suppression of mould growth.

A germination inhibitor obtained by growing *A. flavus* on a water extract of wheat has been isolated and found to be a heat-stable, dialysable acid yielding at least five amino acids upon acid hydrolysis.

Fermentation Equipment and Processes

IMPROVED STAINLESS STEEL PURE CULTURE EQUIPMENT

A. R. Erda and M. W. Brenner (Schwarz Laboratories, Inc.)

Pure yeast culture propagating equipment traditionally has been constructed of tinned copper with brass and/or bronze trim. As long as the lining remained in good condition, operation was satisfactory.

With the introduction of stainless steel into the food and fermentation industries, there arose a demand for yeast propagating equipment fabricated of this material. Transition was not a simple matter of metal substitution, and design changes were necessary. Valving and other trim presented major problems, finally solved by redesign. Protection against vacuum failure and contamination of cultures has been provided economically by unique design features.

Although the basic equipment discussed in this paper was designed primarily for breweries, it may be used in other fermentation industries. Equipment design affords easy manipulation and control. Reduction of operating steps reduces hazards of infection and increases the life of equipment. The cleaning and sterilising operations are simple and certain.

SMALL-SCALE EQUIPMENT FOR DETAILED FERMENTATION STUDIES

H. A. Nelson, W. D. Maxon and T. H. Elferdink (The Upjohn Co.)

Adequate study of most fermentation problems requires careful control of independent variables and scrupulous examination of dependent variables. The fermentor and auxiliary equipment described were designed to facilitate this type of experimentation. The stainless steel fermentor has a 20-l. operating capacity. Variable speed agitator, air sparger, and all other interior facilities are connected through the head, permanently mounted on a frame. The body is removable for cleaning and loading and for modification of the internal components. An improved anti-foam system is used. A small holdup sample line and an air humidifier reduce volume losses to a minimum. A spring-loaded torsion dynamometer and tachometer provide for power measurements. Internal steam-sterilisable electrodes are used for *p*H measurement and control. The vent gases are analysed for CO_2 and oxygen by continuously recording instruments.

BACTERIAL CONTAMINATION OF BREWERS' YEAST

F. B. Strandskov and J. B. Bockelmann (F. and M. Schaefer Brewing Co.)

The normal brewery practice of using the yeast for several successive fermentations before it is replaced by a pure culture, usually results in the development of some bacterial contamination. It was previously observed that the type of bacteria that occur as contaminants vary from one brewery to another. It has been proposed that the type of bacterial contaminant that appears is governed by the

nutritional requirements of the brewers yeast strain being used, and of the contaminating bacteria.

To study this possibility further, yeast samples from three breweries were collected for study. An examination of the yeast samples revealed that each yeast contained a different and specific type of bacterial contamination. The nutritional requirements of the three yeasts and the three types of bacteria were determined. In addition, pure cultures of each of the three yeasts were separated into three batches, and each batch was infected with a pure culture of one of the bacterial types. These infected yeasts were then used in laboratory fermentations and the ability of the three types of bacterial contaminants to grow in these fermentations was observed.

SUBMERGED CULTURE OF FILM YEASTS

M. A. Amerine (University of California)

The Spanish-type sherries are currently produced by growing a film ("flor") yeast on the surface of the wine for periods of from one to several years. During this time the wine acquires a special flavour but the process is slow, requires many small containers, is subject to contamination, and is difficult to control.

Experiments using the Davis controlled fermentation equipment have demonstrated that the "flor" yeast can be acclimatised to submerged culture growth at 14·5% alcohol by bleeding in oxygen or by maintaining a pressure of oxygen over the surface. The process is more efficient when the contents of the fermentor are stirred periodically. Temperatures of 65 to 80°F. have been employed. The process is more efficient when grape juice is fermented and the yeast is left in contact with the wine, compared to introducing small amounts of yeast into finished wine. Autolysis of yeast is apparently a factor. Aldehydes accumulate, and alcohol and the fixed and volatile acids act as carbon sources. The colour of the resulting wine is very light and has a mild "flor" character.

General

CHROMATOGRAPHIC DETERMINATION OF TRACES OF SUCROSE IN BEER

D. A. M. Mackay and R. L. Evans (Evans Research and Development Corp.)

To determine whether traces of sucrose are present in beer, a method had to be found that would detect a few p.p.m. in the presence of other sugars. The paper chromatographic method of McFarren and coworkers (*Anal. Chem.*, 1951, **23**, 1146) was selected for development for this purpose.

A litre of beer was deproteinised, subjected to an alcohol fractionation scheme, and brought to a volume of 10 ml. Aliquots were chromatographed. Sucrose could not be located on the chromatograms of fractions from bottled beer. Since the least amount of sucrose detectable under these conditions was known, this beer could not contain more than 5 p.p.m. of sucrose if the sucrose originally present had survived the analysis. The sucrose content of a draught beer was over 20 p.p.m.

Bottled beer samples were made up containing added sucrose. Sucrose was found in the samples containing 10 p.p.m. or more. At 7 p.p.m., sucrose was just discernible.

To find sucrose at lower concentrations, the final concentrate was purified further by large-scale chromatography. The sucrose fractions were eluted from irrigated chromatograms and reapplied to new chromatograms. After four cycles the sucrose fraction was small enough to be chromatographed with known amounts of sucrose for photoelectric densitometer measurements. No sucrose was found in bottled beer although 0·5 p.p.m. was theoretically detectable. Reproducibility was erratic at low levels and studies were made to investigate this.

Purification of Oysters

THE results of recent experimental researches into the purification of oysters[1] have shown that these molluscs (English and Portuguese) purify themselves satisfactorily when placed in simply constructed shallow pits containing not more than 2 ft. of sea water without previous chlorination, or any other form of sterilisation, for a period of 4 days at any temperature between −1° and 25·2°C. The oysters before being placed in the purification pits must be cleaned of all mud, barnacles, tape worms, etc., adhering to the shells.

The results of the bacteriological examination of the treated molluscs proved that *B. coli* were absent in 1 ml. of oyster flesh after 4 days in the pit, thus showing that a satisfactory state of purity was obtained by this simple method.

When the oysters are required for the market they are lifted from the pit and before being packed are cleaned by rinsing in a wire basket in a tub of pit water, or hosed with the water which is allowed to run to waste. If a special pit is kept for washing the oysters, the water must be either chlorinated or allowed to stand for 4 days before it is used to allow any faecal coli it may contain to die out.[2] It is recommended that the oysters when required for the market be packed in tubs or boxes preferably without any packing to avoid possible contamination. The labels on the barrels should show the number and grade of the oysters they contain, the date of dispatch, and their origin.

This simple check and reliable method of purification enables the oysters to be marketed free from contamination and moreover obviates the use of the more expensive and elaborate methods of sterilisation.

REFERENCES

[1] H. A. Cole, Fishery Investigations Series II, No. XVIII, 5.

[2] R. F. Vaccaro, *Am. J. Pub. Hlth.*, 1950, **40**, 1257.

Advances in Food Technology

GROUNDNUT FLOUR

Preservation Method

The addition to groundnut flour containing 10% oil, of maize oil or maize seed flour offers a good protection against oxidative deterioration. The mixture of groundnut and maize seed flour represents a well-balanced diet suitable for human consumption. —J. Xabregas *et al.*, *Oléagineux*, 1955, **10**, 681.

SMOKED MEATS

Electrostatic Process

Electrostatic smoke deposition is combined with infra-red heating and drying to provide a continuous process for smoked meats by Kingan Inc. It is claimed that the one man needed to load and unload the machine can handle 1,800 lb. of bacon and 3,000 lb. of ham per hr. The machine consists of a 70 ft. long tunnel, equipped with a continuous conveyor for the products. The first 50 ft. consist of a series of identical infra-red ovens, the smoking section is about 10 ft. long, and finally the product enters another infra-red oven which acts as a setting chamber. The smoking section contains ionisers, between which the product passes at negative potential. Smoke particles enter from ducts in the bottom of the chamber and pass the ionisers which are said to "literally hurl" them into the meat.

By separating the heating and smoking operations the drip fats from the product are left free of smoke particles and may be sold at a higher grade.—*Food Processing*, 1955, **16** (9), 5.

APPLE JUICE

Vitamin Antioxidant

Ascorbic acid has long been used as an antioxidant in the food industry. In France, research work extending over the past five years has been carried out to elucidate the oxidation phenomena in apple juice, and particularly the well-known browning, by means of a colorimetric method as well as by measuring the oxygen absorption. The results indicate that if the new technique of antioxidative vitaminisation is to be fully effective as well as economic, the quantity of ascorbic acid to be added to the juice must be carefully controlled. It is not advisable to add the full quantity all at once. If the vitamin is added too late, it does not afford sufficient protection against oxidation phenomena, and it becomes almost impossible to reduce the oxidation products already amassed. If added too early, some of the ascorbic acid is wasted. The correct quantity and timing varies with the different varieties of apples and with the juice production method.—C. Bogdanski, *Boissons Douces Légères*, 1955, No. 29, 14.

ANALYSIS

Shortened Method for Phosphorus Determination

A shortened procedure for the colorimetric estimation of phosphorus in foodstuffs by which 95% of the total phosphorus content is determined was found by digesting a number of foodstuffs and a few biological materials with sulphuric acid for 5 min. and determining phosphorus colorimetrically in the digest. Phosphorus was also determined after complete oxidation. Comparison of corresponding values by both procedures showed that the shortened digestion procedure measures about 95% of the total phosphorus. The method can be adopted for the routine determination of phosphorus in foods and other materials where only comparative data are needed.

The presence of partially digested products of sugar or protein in the foodstuff does not interfere with the colorimetric estimation of inorganic phosphate.—H. S. R. Desikachar, *J. Sci. and Ind. Res.* (India), 1955, **14C** (1), 32.

FOOD PRESERVATION

Dehydrated Pre-cooked Meals

With a method invented by a German food chemist, Dr. S. Zimmermann, vegetables, meat products or dairy products are dehydrated in a fat or oil bath under high vacuum at low temperature. The moisture regain capacity of the food is preserved by the entry of the fat into the intercellular spaces of the tissues during the drying process. In this way, the foods retain their vitamin contents and their flavours and odours. The process is therefore particularly suitable for composite meals. To prepare the meal, the dehydrated food is cooked with an appropriate quantity of water and allowed to stand on a hotplate for a short time to permit a complete moisture regain. This method was developed for the German army during the last two years of the war, and has now been revived. A testing laboratory has been created to bring the method up to date.—G. Zimmermann, *Die Fleischwirtschaft*, 1955, **7**, 616.

TOMATOES

Chromatographic Detection of Salicylic Acid

Salicylic acid in tomato preserves is usually detected by the ferrous chloride test. But as raw tomatoes often contain small quantities of substances causing reactions similar to those of salicylic acid, this test must be supplemented by a quantitative colorimetric determination. Good results have been obtained with a paper-chromatographic test which also permits, without special quantitative determination, a distinction between the natural contents of salicylic acid or similar substances on the one hand, and special admixtures on the other hand. The method is simple yet accurate enough for normal purposes.—Maria Vietti-Michelina, *Información Conservera*, 1955, **3**, August 17.

Food Science Vital for Solving Factory Problems

APPEAL BY B.F.M.I.R.A. DIRECTOR

THE vital need for food manufacturers to realise that they were moving into an era when research was more essential to them than ever before was emphasised by Dr. F. H. Banfield, director of research of the British Food Manufacturing Industries Research Association, in a statement accompanying the issue of three of the association's research reports.

Dr. Banfield said, "Only scientific knowledge and research can overcome many of the problems arising in the food factory to-day. Variations in the raw material, difficulties in the development of new products, or changes in public taste requiring modifications in existing products, all call for close and specialised investigation in the laboratory.

"It is a matter for the greatest regret to the industry as a whole, therefore, that many companies, and in particular the smaller ones, do not appreciate what can be done to help them, through research, in defeating these problems, in increasing efficiency and in safeguarding standards."

The new food products now coming on the market would continue to expand in number and variety in response to public demand. "But they can be produced only with the scientist's aid: he is essential."

Greater responsibilities, continued Dr. Banfield, were placed on manufacturers by the regulations which could be made, under the recent legislation, to cover such matters as additives to food. "The fullest scientific facilities are necessary to meet these requirements. Unfortunately, too many firms do not have them or realise that they are available to them through their own research association."

The three research reports referred to are of interest to bakers, food paste producers and makers of meat pies and other jellied goods. The reports are restricted to members of the association, but an outline of their contents follows:

Fish pastes

After a large number of experiments, using different varieties of fresh or frozen fish, the association has succeeded in preventing the shrinkage which occasionally occurs in fish pastes packed in small jars. This shrinkage of the solid contents away from the inner surface of the jar leaves patches of liquid which give an unsightly appearance.

Some years ago the association prevented such effects in meat pastes, but when applied to fish pastes the same technique was not satisfactory. This resulted from the behaviour of fresh or frozen fish tissues compared with those of meat when passed through the manufacturing processes.

The solution of the problem in the case of fish pastes presented many obstacles. These have now been overcome and the shrinkage and aqueous separation responsible for the trouble prevented.

Texture of gelatine gels in meat pies and jellied goods

The association has found a way to the more effective and economical use of gelatine in jellied goods.

The problem was to produce for meat pies and meat or fish products in glass a jelly stock which would remain sufficiently firm under all normal temperature changes met with during distribution and consumption, and which would not be too tough for pleasant eating under cool conditions.

The rigidity of a series of jellies was determined by measuring the depression caused in the centre of the meniscus of the jelly in a narrow glass tube when a known air-pressure was applied.

Interesting practical results emerged from the experiments. The association's report also indicates a method of raising and extending the range of temperatures over which the jelly will show satisfactory firmness without undue toughness at the lower temperatures.

Bakery curd

The report describes experiments by the association designed to study the effect of variation in ingredients and manufacturing processes on the baking properties of curds. The research was undertaken to find out the cause of the defect of "boiling-out" with which manufacturers are periodically concerned.

Curds which have this tendency are apt to boil over the edge of tarts during baking, and apart from the loss of appearance in the finished tart, the inconvenience to the baker in cleaning the ovens is considerable.

Despite carefully standardised processes of manufacture, states the association, occasional batches which boil-out are met with and may result from variations in the properties of the raw materials. Another cause may be variation in the consistency of the curd which prompts the baker to alter it by adding water.

The association has found means whereby manufacturers can produce curds in such a way as to avoid the tendency to boil-out.

The routine of a bakery is featured in a recent issue of Wiggin Nickel Alloys (No. 33). Describing the Monel plant at the Ormeau Bakery Ltd., Belfast, including equipment made from some of the first Monel sheets to be rolled in the U.K. over 25 years ago, the article outlines the operations carried out in the large-scale production of bread.

Comparative costs of electric and petrol powered industrial trucks are given by Brush Coachwork Ltd. in a small pocket brochure. It is claimed that although the initial cost of an electric truck can be nearly double that of a similar capacity petrol engine truck, its running costs are much cheaper. According to the booklet these can be 5½d. per mile compared to 9d. per mile for a petrol truck.

Industrial Re-rating in the Offing?

ONE result of the new rating bill is that various sections of the community are lining up their big guns against de-rating, particularly industrial de-rating.

The rating revaluation will include industrial premises and their gross values will be fixed in accordance with their full current rental values. In some cases this will involve substantial increases, but at whatever figures the new assessments are fixed, factories and workshops will only pay rates on one quarter of the assessment.

Industrial de-rating was first introduced at a time when British industry was in bad shape. Its objects were to decrease unemployment and to increase exports. Five years after its introduction, unemployment had almost doubled and exports were only about half of what they had been. These facts gave rise to the facile claim that industrial de-rating had failed to achieve its objects, but a testing period of only five years was obviously too short to permit any firm conclusion to be reached. However, there is no doubt that today British industry is in a better position to pay full rates than it has ever been.

Local councils are generally in favour of the abolition of industrial de-rating. They would not make any specific gains from the re-rating of industrial premises, but their gross rateable value would increase and this would enable them to reduce poundage rates. A reduction in poundage rates always pleases private householders, and it is the private householders who elect local councils.

In addition, local authorities feel that industry takes quite a large share in the benefits and services provided by councils—maintenance of highways, lighting, refuse disposal, technical and ordinary education, and so on, and that there is now no good reason why industry should not pay its full share of the cost of these benefits.

Shopkeepers will soon be actively up-in-arms against industrial de-rating. Under the new rating bill, assessments on business premises may be increased by as much as 300%. Poundage rates will go down at the same time, but shopkeepers will have to pay a considerable amount more in rates. At a very rough guess, poundage rates will probably drop by about one-third in most districts, but if a trader's rateable value is trebled (a not improbable jump) he will have to pay twice as much in rates. The following brief computation indicates the effect on a shop with a rateable value of £50 in a district where the rates are 30s. in the £.

At present trader pays on £50 at 30s. = £75

In future trader will pay on £150 at 20s. = £150

In most of the distributive trades there is a fixed rate of gross profit which is virtually the same all over the country, and it can only be made to stretch so far. Put another way, it is always very difficult for a distributive trader to pass on extra overheads to his customers: he is usually obliged to meet them out of his profits. And in this connection it should be borne in mind that according to a recent report made by the Inland Revenue Department, nearly one million small traders in this country are assessed for Income Tax on profits of less than £500 a year. Obviously it is going to be very difficult for such traders to absorb rating increases of this calibre. Naturally, shopkeepers will kick hard against these increases and in the course of doing so they will press for the re-rating of industry.

Householders are not likely to raise any immediate outcry against industrial de-rating. Houses, too, will be re-assessed in 1956, but only at their 1939 rental values. This will probably involve an average increase of about 50% in rating assessments. Such a moderate increase, combined with a drop of one-third in the poundage rate, will leave the householder in almost the same position as regards the actual amount to be paid in rates. In 1961, however, private houses will also be assessed at their full current rental values, and householders will then join shopkeepers in the cry that they are subsidising industry in the matter of rates. But it is possible that industry will have been re-rated before 1961.

Industrialists take the view that if de-rating is abolished, commodity prices will go up and this will lead to increased wages demands, and a general increase in the cost of living. Export sales will decrease as British industry will be less able to compete in foreign markets.

There is no doubt that considerable pressure will be brought to bear on the Government during 1956 and subsequent years to abolish industrial de-rating. If this pressure is successful, industry's only consolation will be that the extra rates paid can be claimed as a deduction for tax purposes, so that the Government will have to share the extra burden.

D. COMPTON-JAMES.

Food and Farming

CLAIMED to be the only book to cover so many closely related fields so broadly, a new, almost encyclopædic, work consists of over 1,000 pages of concise information on food and agriculture.* Chapters, each written by a specialist, are provided on soils and plant growth, nutrition, preservation, food processing, storage of raw products, waste disposal, packaging and many other topics.

Each author has used his own method to develop the subject-matter of his chapter so that there is no uniformity of style throughout the book. In a foreword the editor explains that this is deliberate and that editorial changes have been kept to a minimum. A particularly interesting feature is the appendix, which includes sections on food laws, nutrition, special food agencies (such as the F.A.O., W.H.O., etc.), research groups in the U.S.A. and such miscellaneous information as a classified list of journals, etc., covering food research and technology.

* *Handbook of Food and Agriculture.* Edited by Fred C. Blanck. Reinhold, New York (London, Chapman and Hall). Pp. vii + 1039. Illustrated. 100s. net.

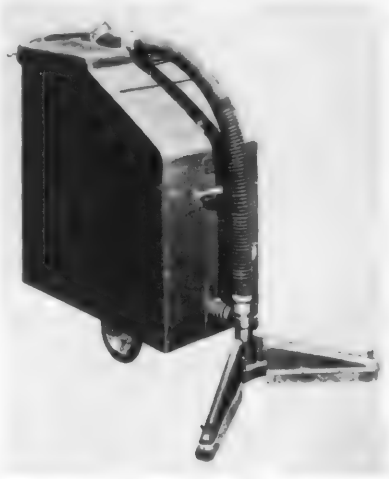
Machinery and Equipment

Vacuum cleaner attachment

Filtavac Ltd., manufacturers of portable industrial vacuum cleaning plants, announce a new development which, they claim, overcomes a weakness of industrial vacuum cleaners. It is an attachment for coupling to their model RM22 machine in a matter of seconds for large-area floor and gangway sweeping which can then be executed at a smart walking pace. Without interfering with production, dust and dirt are removed, and an adjustable slide incorporated in the tool allows the removal of the usual factory debris—all without raising any harmful dust.

The new attachment is called the "Chevron Floorsweeper," and is said to be the only tool of its type in the world. It is made in three standard widths of 18, 24 and 30 in.

In many cases this attachment might obviate the need to instal expensive, rotary-type floor sweepers, it is stated.



"Chevron" attachment for industrial vacuum cleaner.

New refrigeration equipment

Refrigeration equipment displayed at the Dairy Show included a portable cold-storage room, a rotary booster compressor requiring about one-third of the space of similar machines and a machine producing ice flakes at the rate of about 10 lb. per hr.

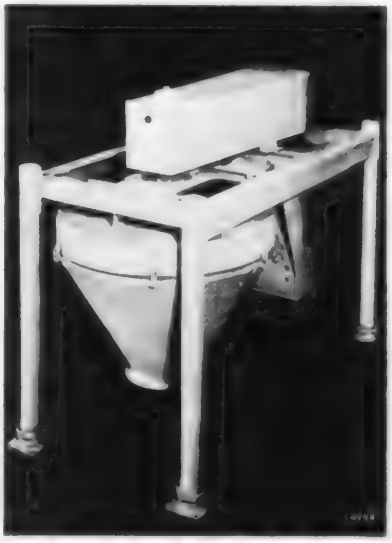
Hawson's preconstructed *Walk-In* freezer consists of insulated units weighing 85 lb. each, which the company claim can be erected without technical help in about 2 hr. to form a cold store 7 ft. × 7 ft. × 7 ft. The hermetically sealed compressor unit uses little current and is thermostatically controlled. Ultra-violet irradiation tubes are provided which are switched on and off by the closing and opening of the door. The complete unit is priced at £596, 10s. 6d.

York Shipley Ltd. displayed their *York* rotary booster compressor for the first time at the Dairy Show. They claim that the unit, which is designed for temperatures down to −90°F. and has a motor which may be up to 500 h.p., needs only 100 sq. ft., whereas single-acting compressors of similar output might well require three times that area.

Also shown for the first time was the Model DER 2. *Flak-Ice* unit, a self-contained machine producing 10 lb. of ice flakes per hr. The machine is sub-cooled and its curved flakes flow readily down a sloping chute. There are no sharp curves which might damage soft foods, and it is recommended for packing fish and poultry and for cooling milk and other bottled beverages. It is also used for cooling meat in sausage manufacture where it will not damage the blades. The machine needs only 4 sq. ft. of floor space, electrical supply and two small water pipes. Ice is released mechanically, not by means of electrical heat, so as not to waste power.

Impact grinding

Grinding and pulverising through impact is the main function of the *Entoleter* impact mill which is now available to the food industry through Henry Simon Ltd. This machine, which employs a centrifugal action, will carry out many of the tasks performed by hammer mills, attrition mills and other grinding machines, and substantial reductions in maintenance and power costs are claimed.



Impact mill for grinding and pulverising flour, sugar, cereals, starches and other foods.

Henry Simon Ltd. have for some years been distributing similar centrifugal machines for controlling insect infestation in food products and for high-speed mixing and, while the *Entoleter* impact mill will readily perform these duties, its greater capacity and speed make it particularly suitable for particle size reduction. Flour, sugar, groats, cereals and starches are among the materials handled.

The essential mechanism is a motor-driven high-speed rotor composed of two horizontal discs separated by rows of steel impactors. The material to be reduced is fed over a conical distributor to the centre of the discs which rotate at a predetermined velocity. It is spun out centrifugally between the discs in a thin curtain, colliding against the impactors and the rotor housing. The treated material falls into a round delivery hopper below the rotor and through the outlet spout. There are no frictional resistances between the particles of the materials handled, the reduction being caused by impact only; materials subject to heat degradation therefore are successfully processed with a temperature increase of 15° F. or less, it is claimed.

Capacities range from 200 to 500 lb. per hr. per h.p. expended, depending on the material used. Machines up to 40 h.p. are available. The mill will treat any reasonably free-flowing powders and most granular materials. It has no effect on moisture content.

The mill can be used as a high-speed mixer, its centrifugal action producing a smooth, homogeneous mix quickly and economically.

It can also be used as an infestation controller.

New food machinery factory

In response to the increasing demand for their *De Laval* centrifugal separators, the Alfa-Laval Co. Ltd. have opened a modern factory at Cwmbran, Mon. The latest automatic machine equipment has been installed for the production of the centrifuges.

The development of *De Laval* centrifugal separators is largely associated with the immense expansion in so many industrial fields. From the original duty of separating cream from

Part of the new factory opened by the Alfa-Laval Co. Ltd., at Cwmbran, Monmouths., for the manufacture of centrifuges and other food machinery.

milk, numerous types have now been developed for the problems met with in the widely different industries. They are manufactured in a large number of sizes ranging from the small type laboratory units to large high capacity equipments. These include machines for continuously separating one or two liquids and solids, and larger machines now handling up to 20 tons/hr. of liquid open new fields of application, *e.g.*, for effluents, etc. The centrifugal separators form the heart of the plants designed for the starch and vegetable oil refining industries. Also included in the *De Laval* range of equipment are plate heat exchangers, stainless pumps and the horizontal de-sludger centrifuges.

Space-saving tray washer

Specially designed to save space, the Dawson vertical-type tray-washing and drying machine, which has a capacity of up to 1,000 trays per hr., is 30 ft. long × 4ft. 9 in. wide × 9 ft. 10 in. high. The machine is robustly built and seated on continuous rolled steel channels. A continuous moving conveyor is incorporated consisting of a series of flight bars bolted to two Renolds 4-in. pitch chains.

The trays are loaded by hand on to the conveyor, two trays wide on edge, and as they pass through the machine receive a highly concentrated detergent wash at approximately 160°F., washing internally and externally and along the sides by means of pressurised jets. Following this the trays are allowed to drain for a period and then enter another compartment where they receive a hot rinse at approximately 160°F. The next operation is a sterile rinse at a temperature of between 180° and 200°F.

The trays then pass into a final chamber where they are subjected to hot air circulation to assist drying. This chamber is of double skin design and well insulated. Hot air is circulated from a centrifugal fan coupled to a steam-heated heater battery. The air is recirculated into a return duct provided with a damper to allow the intake of fresh air.

The first and second wash tanks are constructed with lift-up panels in such a way as to provide easy access to all spray pipes for cleaning purposes. These pipes are arranged with a located connection to the main pipe box, and this is fed from the recirculating pump.

The detergent tank is heated by a steam coil and the hot water tank by a silent steam ejector.

The machine is provided with manhole doors for cleaning purposes and is complete with steam traps, thermometers, water and steam feed pipes, the latter being connected to two common headers located at the top of the machine, adequate drains and overflows which can be connected to a common drain, and vapour outlets at the top of the machine which can be connected with trunking to atmosphere either by forced extraction or natural ventilation.

Yale trucks show their paces

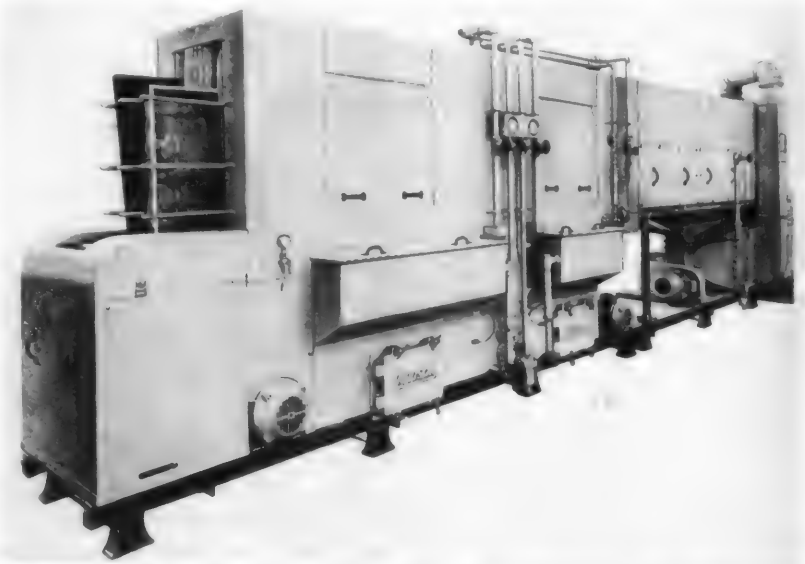
A large-scale demonstration of electric and hand lift industrial trucks was held by Yale and Towne Ltd. at the Southampton works of A. C. Delco (Division of General Motors) before about 70 people from industry, the nationalised industries and government departments.

The show, which lasted a day and a morning, consisted entirely of Yale equipment in use on various customers' premises. Electric trucks shown included a *Warehouser* rider type, fork lift model, pallet, platform and fork lift *Worksavers*. Among the hand trucks were *Multistroke* pallet, *Lift-Easy* pallet, *Blue Streak* and *Zephyr* models.

Fuel efficiency plant

A compact boiler installation providing packaged-power steam in a range of sizes from 1,500-18,000 lb./hr. or equivalent heating output in B.Th.U. was exhibited last month at the Fuel Efficiency Exhibition by Spencer-Bonecourt-Clarkson Ltd. (a subsidiary of Babcock and Wilcox Ltd.). The chief advantages of the *Steambloc* boiler are: it is a completely self-contained unit, it is oil-fired with completely automatic control, it has a number of safety devices, and it requires no special boiler house or tall chimney stack. Since it is a forced draught unit it needs only a rudimentary vent for exhaust gases.

The *Oldbury* chain stoker was exhibited by another Babcock and Wilcox subsidiary, Edwin Danks and Co. (Oldbury) Ltd. together with the more recent Oldbury *Minor* stoker. The latter is intended for hot water boilers of ¾-2¼ million B.Th.U./hr. capacity and differs from the larger version by using a silent ratchet instead of a continuous



New vertical type washing and drying machine with a capacity of 1,000 baker's trays per hour.

drive and by operating both the grate drive and the forced draught fan from the same motor. Automatic control is achieved by speed variation of the main motor to respond to variations in the temperature of the exit water.

Boiler mountings, valves and associated equipment were shown by Hopkinsons Ltd., including a range of standard valves for pressures up to 2,000 p.s.i. Grouped arrangements were displayed of full lift safety valves, forged steel valves, pressure gauges, water level indicators, soot blowers and valves for industrial purposes. New equipment displayed included a television system for remote water level indication and lapping machines for parallel-slide valves. In addition, an electric Hopkinson-Ferranti valve, an automatic electrical regulator, centrifugal purifiers and steel castings were shown.

New Votator laboratory

Their new *Votator* laboratory at Acton, London, was the central feature of a private exhibition held recently by A. Johnson and Co. Ltd. The use of the apparatus in processing gelatine was demonstrated.

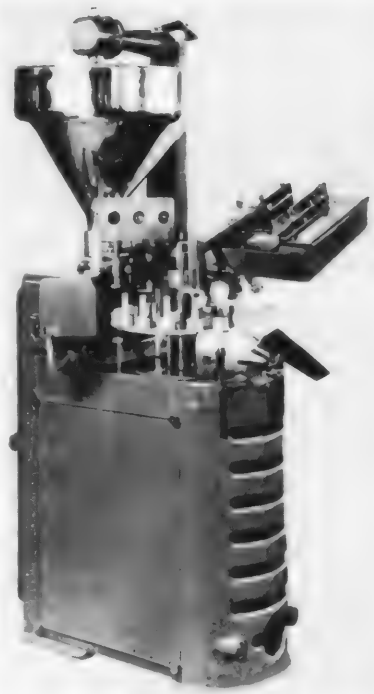
For a number of years the company has been licensed to make the *Votator* apparatus by the Girdler Company of U.S.A. It is estimated that at least 80% of British and American margarine is manufactured by the process, which is said to provide a product of uniform texture, consistency and weight, being continuous from emulsion to the finished and packaged product. The apparatus can also be used for the production of lard and vegetable oil shortening, starch gum jelly, slush-freezing fruit and vegetable pulps, etc., marshmallow processing, cake and wafer batter mixing and many other purposes.

Visitors were also shown round the company's stainless steel fabricating department where the manufacture of storage vessels, trolley tanks, batch pasteurisers, cream vats and other equipment for the food and dairy industries was seen.

Drum-packing machine

Spices of all kinds, pepper, baking-powder, epsom salts, etc., can be successfully packed in the *Autopack* drum- or tin-packing machine, claim its manufacturers, Autopack Ltd. The machine will handle either drums or round or rectangular tins, including the standard American can.

Filling is effected by an *Autopack* precision-type quadrant filling machine, said to give a very fine degree of accuracy, to require a minimum of attention, and to permit of very easy alteration of the amount of fill. Special funnels are arranged to take the filling right down into the can, and reduce dust to a minimum. The drums or tins are fed into the machine on a conveyor, and taken to the filling point by a rotor, and, after filling, the material is vibrated down and, when necessary, pressed into the container, while it passes round the rotor on its way to the outlet conveyor.



The improved Kalix-Dupuy tube filling and closing machine, said to be now one of the fastest automatic filling machines available.

The filling unit will handle up to 4 oz. of material, and the machine has an output speed of up to 40 drums per min., with a single filling unit, or up to 80 drums per min., using a twin filling unit. The machine is well-designed, needs little maintenance, and requires only the part-time attention of a single operator.

Faster tube filling

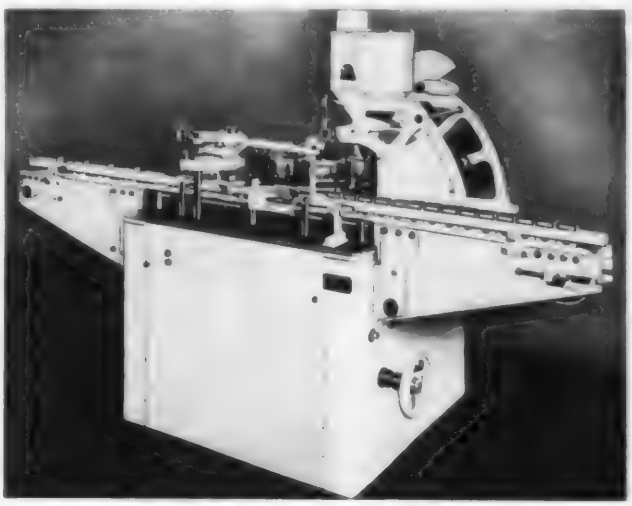
The speed of an automatic tube-filling machine is usually limited by the speed with which an operator can insert tubes in the holders and position them to ensure that the design is central after the tube is closed. The use of two operators instead of one may increase output but it cancels out the saving brought about by automatic filling. To enable the Kalix-Dupuy Model Super R.V.7. tube-filling machine to run at maximum speed the manufacturers, Flexile Metal Co. Ltd., have recently introduced two improvements.

The first attachment is a semi-automatic tube-feeding device. By this means the operator places tubes in a chute, from which they are automatically picked out one by one and placed in the tube holders as they are brought underneath the feeding device by means of the rotating turntable. As the tubes approach the filling station a centering device actuated by a photo-electric cell turns the tubes in the holders until the design is central. It is necessary to print a registration mark on the tube. As most of this mark is subsequently hidden by the fold, it does not interfere with the design. It is said that the work of the operator is simplified to such an extent that even an unskilled operator can keep the machine running at its maximum speed of approximately 60 tubes per min.

A new, smoothly acting pump mechanism and the provision of sturdy bronze brushes on all bearings make the machine capable of trouble-free continuous running at maximum speed. The machine is claimed to be suitable for all tubes from ½ drachm to 8 fl. oz. and can be provided in models to give 2 fold, 3 fold or saddleback closure, with a coding device if required.

Correction

The caption to the photograph on p. 456 of the November issue of FOOD MANUFACTURE should read "A.P.V. cream treatment unit, Type L.3."



This new drum or can packing machine has an output of 40 units per min. A twin filling version can handle double this number.

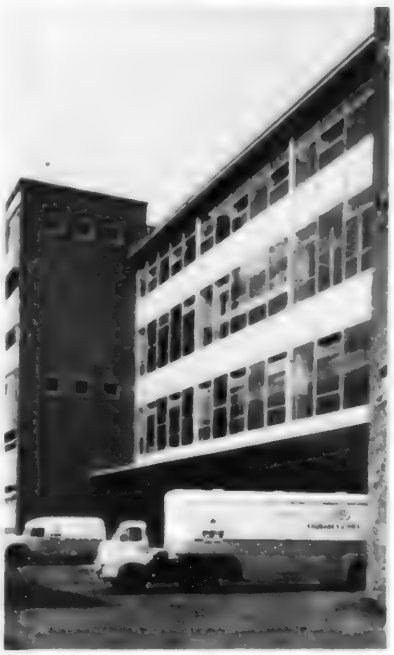
News Digest

Wall's Open Another Meat Products Plant

WITH a fanfare of trumpets (literally), the new meat products factory of T. Wall and Sons Ltd., second in size in Britain only to their own London plant, was officially opened on November 11.

Sited at Godley (Cheshire), the new factory will employ 700 people to produce about 350 tons a week of sausages, pies, cooked meats, liver sausage, luncheon sausage and other meat products.

The production floors, cold storage department and personnel and welfare departments are all housed under the same roof. In the photograph the van is receiving finished goods for dispatch from the ground floor, which also houses cold stores, raw materials, meat reception rooms, the factory offices and quality control staff, finished goods stores and utensil washing facilities. The meat preparation department is on the first floor, the bakery on the second floor and the sausage department—about two-thirds of the finished products will be sausages—on the third. An area for the manufacture of cooked sausages and cooked meats is also included on the first floor. The whole factory was built in 18 months.



Wall's new factory at Godley, Cheshire.

Milk the "staff of life"

If any food was entitled to be called the "staff of life" it was milk, said Mr. T. Peacock, chairman of the Milk Marketing Board, at the opening of the Brighton Equitable Co-operative Society's Dairy, Brighton, recently. Milk provided nearly 10% of the energy value of the food eaten in the homes of this country, about 17% of the protein and nearly 50% of the calcium, as well as high proportions of the important vitamins. Its importance, however, both in nutrition and as a good drink were still not fully appreciated.

Mr. Peacock pointed out that few of the many people driving cars today appreciated that for the same price as a gallon of petrol they could get a full gallon of wholesome milk. The price of a packet of cigarettes would also pay for six pints of milk, one for each of six days out of the seven. Milk was, in fact, cheap in relation to its food value.

Mr. Peacock said it was in the interest of the nation as a whole that more milk should be drunk. Milk consumption could be increased at home, particularly by children. A recent survey carried out for the Board had shown that, in the week it was made, half the children did not drink a glass of milk at home at all. The survey indicated, in fact, that, although children between five and fifteen years were growing creatures, they did not appear to drink any more milk at home than adults.

Pig production report

The report of the Committee on the Development of Pig Production in the United Kingdom was published recently.

The committee was appointed in January this year under the chairmanship of Sir Harold Howitt to advise in what ways pig production would best be developed, particularly in regard to general breeding policy and production methods, in the light of prospective market requirements for pork and bacon in the United Kingdom.

After surveying the organisation of the pig industry and the demand for pigmeat in this country, the report discusses the types of pigmeat likely to be required during the next few years. It recommends that the industry should concentrate on three types of pig for commercial production; a specialised pig for bacon curing; a specialised pig for lightweight pork production at 80-100 lb. deadweight; and a dual purpose pig which would be suitable both for the medium and heavier weights of pork and for bacon. The bacon or dual purpose type of pig carried on to heavier weights without putting on too much fat would also meet the present demand for heavy pigs for manufacturing. The committee makes a number of proposals on breeding policy, production methods and research.

Potato imports

Because some doubt has arisen about the meaning of the Open General Licence, under which imports of potatoes other than seed potatoes and ware potatoes are at present admitted without an individual import licence if originating in and consigned from a country or territory other than one listed below, the Board of Trade announce that the O.G.L. has been amended so as to state specifically that the only types of potatoes which are admissible without an individual licence are new potatoes and sweet potatoes. Importers should not, therefore, enter into any forward contracts for the import of potatoes other than those.

The countries listed are Albania, Argentina, Bolivia, Bulgaria, Canada, Colombia, Costa Rica, Cuba, Czechoslovakia, Dominican Republic, Ecuador, El Salvador, Germany (Russian Zone), Guatemala, Haiti, Honduras, Hungary, Japan, Korea, Liberia, Mexico, Nicaragua, Panama, Philippines, Poland, Roumania, U.S.A., U.S.S.R. and Venezuela.

No import duty increase

Import duties will not be increased for cider apples, dried apples and pears, cherries, loganberries preserved in syrup, fruit mixtures, canned asparagus, peas and some other vegetables (except tomatoes, beans and maize) and preserved onions (other than silverskin), state the Board of Trade. Applications for increased protective duties have been made for a number of horticultural products and in some cases the duties were increased. However, the Government has decided that there is no case for increased protection of the above. A number of items still remain under consideration.

Canning machinery demonstrated

Over 200 guests from Britain and overseas attended a demonstration of machinery and a luncheon held by Mather and Platt Ltd. at their Radcliffe, Manchester, works. The demonstration included a complete pea canning line, which was continuous from two all-metal super viners with outputs of 20-25 cwt. of peas, to an automatic pressure cooker and cooler, and was followed by some Standard-Knapp automatic labelling and packaging machines, which Mather and Platt are manufacturing in this country under an arrangement with the Standard-Knapp division of Emhart Manufacturing Co.

Guests, most of whom were food canners, were also conducted round the factory to see demonstrations of the company's various canning machines. Besides the food preparing and canning machines for which the company is famous, the guests were shown several interesting new designs, including a high-speed solid and liquid filler with a maximum speed of over 250 cans per min. and provided with quickly removable valves and a synchronised drive to avoid spill, and the *Hydron* fruit cooker and cooler. Also shown were a high-speed universal filler (for pastes, semi-liquids, oils, etc.), with a maximum speed of over 400 cans per min., fitted with quick release valves and a pneumatic "no-can no-fill" system. This system also operated on the A10 can filler for solids. Other new machines shown included a screen washer with a throughput of 4 tons of peas per hr., provided with interchangeable screens, a split type, stainless steel blancher with a 15 ft. drum and an all-metal winnower fitted with an aluminium shaker tray and special shaker hangers for smooth running.

Visitors were welcomed by Mr. L. E. Mather and Mr. W. L. Mather. Mr. T. W. Winterson (Wm. P. Hartley Ltd.) proposed the vote of thanks on behalf of the guests.

£2·8 million steel scheme

By the end of 1957, the two largest electric furnaces for steel melting in Britain will be housed side by side in the Stocksbridge Works of Samuel Fox and Co. Ltd., associated with The United Steel Companies Ltd. The first furnace—now tapping 70 tons—was installed last November and has proved to be an outstanding success. The new furnace, which will be of similar capacity, forms the central feature of a £2,845,000 development scheme on which work is just beginning.

It will result in a substantial addition to the tonnage of special and alloy steels available each year for use by some of our most important export industries—motor vehicles, civil aircraft, steam generation plant and chemical and food plant.

A group of overseas visitors studying the high-speed solids and liquids filler at the demonstration of canning machinery held by Mather and Platt Ltd., at their Manchester works.

To process this extra quantity of steel, Samuel Fox, who are one of Britain's largest producers of alloy and stainless steels, plan simultaneously to modernise their billet rolling mill. This will be accomplished by installing new electrically-driven mill stands equipped with the latest mechanised aids. When completed, the modernised mill will have a capacity of some 8,000 ingot tons of steel a week—one third more than at present.

Present-day imports of special steels for consuming industries should be considerably reduced after the new scheme has come into operation.

Skinless, pre-packed sausages

Pre-packed, skinless sausages in beef, pork and frankfurter style have been introduced by R. D. Waddell Ltd. of Glasgow. This is believed to be the first complete range of skinless pre-packed sausages offered in the trade, earlier products having been limited to one type only. Wrapped in transparent film and on a tray base, the skinless sausages will be sold in approximately 1 lb. and ½ lb. sizes, the exact weight varying according to the individual sausages.

The sausages are said to keep their shape and size in cooking, and special cooking instructions will be issued on the reverse side of the pack. Cost is actually less than for similar weights of cased sausages, the saving of casings being greater than the cost of packing. It is claimed that the new products will hold over for five days under normal conditions and indefinitely where the shop has deep-freeze holding facilities.

Scottish food exhibition

The Russian Government has taken space at Scotland's Food Exhibition to be held in the Kelvin Hall, Glasgow, from April 10 to 21, 1956. The largest space has been taken by the Dutch Government.

Lighting and productivity

"I can see no hope of general factory lighting ever serving industry as it should until a true balance is struck between natural and artificial lighting, and until we cease to treat artificial lighting as merely a necessary evil."

This opinion was expressed at Swansea recently by Mr. W. Robinson, lighting officer of the British Electrical Development Association. He was speaking on "Lighting as an Aid to Productivity" at the invitation of the local Productivity Committee.

Why is it, asked Mr. Robinson, that one factory will struggle along on a miserable diet of 5 foot-candles of artificial lighting, while another factory will have 50 foot-candles, and ask for more? Why is it that in the United States 100 foot-candles is quite normal, and that their average illumination is at least three times ours?

It was possible, said Mr. Robinson, to improve working efficiency by increasing grossly inadequate illumination, but we had passed this particular stage. At the present time most factories had lighting which conformed with minimum illumination requirements, and it was very difficult indeed to prove by tests that such factories should still further improve their lighting.

Anglo-American plastics enterprise

Polystyrene moulding materials and toughened polystyrene are now being made in this country by Distrene Ltd., a company jointly owned by the Distillers Co. Ltd. and the Dow Chemical Co. of U.S.A. The products will be known as *Styron* 666 and 475, indicating the moulding materials and toughened materials respectively, and as *Distrene* abroad. The rated capacity of the new *Styron* plant is from 6,000-7,000 tons per year. It is situated on the 92-acre site at Barry, South Wales, occupied by two other companies in the Distillers Group making plastics materials, British Resin Products Ltd. and British Geon Ltd.

Distrene Ltd. are manufacturers of the primary materials only and will not make any semi-fabricated or moulded articles.

It is said that *Styron* is particularly suitable for the packaging of food, being moisture-resistant, non-toxic and corrosion-proof.

Birmingham office for B.S.I.

A new sales office has been opened in Birmingham by the British Standards Institution in co-operation with the Birmingham Chamber of Commerce. It is situated at the headquarters of the Chamber at 95, New Street, Birmingham 6.

U.G.B. open Leeds office

United Glass Bottle Manufacturers Ltd. have established a sales office at 10, East Parade Chambers, Leeds 1 (Telephone 34481/2). The branch manager is Mr. W. H. Grime.

Imports of N. American canned fruits

The Board of Trade and the Ministry of Agriculture, Fisheries and Food announce that traders will again be allowed to import certain varieties of canned fruit from Canada and the U.S.A. The varieties are: Apricots, cherries, figs, peaches, pears, plums, fruit salad and fruit cocktail.

Imports of these varieties of canned fruit will be allowed from Canada up to a value of $300,000. The value of imports from the U.S. will depend upon the amount of dollars available under the U.S. Mutual Security Act, but will be not less than $2.6 million. Licences for imports from both countries will be valid until April 30, 1956.

Details are given in Notice to Importers No. 753, issued by the Import Licensing Branch of the Board of Trade.

The Board of Trade also announce that arrangements have been made for the import from the U.S.A. of fresh pears to a value of £335,000, and of grapes, other than hothouse, to a value of £220,000, both to be purchased with dollars made available under the U.S. Mutual Security Act. The fruit will not be eligible for any American export subsidy. Licences will be issued for imports of fresh pears from Canada against a quota of £20,000.

Details are given in Notice to Importers No. 755, issued by the Import Licensing Branch of the Board of Trade.

Irradiation plus refrigeration in food van

A new type of delivery van, the *Autofreezer*, equipped with mechanical refrigeration, vacuum cold plate, and an irradiation lamp, is being produced by Hawson Ltd., under the supervision of Penfold and Partners.

Inner and outer body linings are of lightweight aluminium alloy, and the insulant is expanded ebonite of high thermal efficiency, allowing a greater pay-load and, because no ice is carried, greater storage capacity.

The *Autofreezer* has been designed to carry meat, bacon, fish, deep-frozen foods, vegetables, fruit, butter, cream, cheese, ice cream, milk, beer and yeast, with one or more completely equipped compartments. One of the important features is the direct drive, high-speed compressor mounted on the van engine, and designed specifically for automotive application.

Amino acid for animal feeds

Because of many enquiries for experimental quantities of the amino acid L-lysine monohydrochloride for incorporation in animal feedstuffs, L. Light and Co. Ltd. have made this substance available in quantities ranging from 1- to 5-lb. lots. The price is between £8 and £9 per lb. compared with £75 per kg. for high purity material.

Another Scots seaweed factory

Alginate Industries Ltd. have decided to erect a new seaweed processing factory at Sponish, North Uist, to supplement the work they are already doing in South Uist. The company asked the Inverness-shire Planning Committee to provide premises for lease, but have failed to secure support in this direction. They are now asking that the committee give all other support, stating that they will provide the necessary premises themselves. This the committee has agreed to do, since seaweed harvesting and processing is one of three ventures which are seen as likely to expand industry in the area.

Scottish seaweed now provides the basic raw materials for a wide range of products in the food, pharmaceutical, chemical, feedstuff and allied industries, and although the Institute of Seaweed Research is to be closed, the work they have done, supplementing the practical work of the companies in this field, give reasonable assurance of a steady development of the seaweed industry in Scotland.

National Poultry Show

The National Poultry Show—the "largest ever" exhibition of table poultry—is to be held at Olympia on December 7, 8 and 9. Over £250 in cash prizes and special awards are being offered. The display has the support of the Ministry of Agriculture, the Worshipful Company of Poulters and all the Industry's own organisations.

Among the exhibits will be a complete packing station showing the preparation of birds for marketing—from plucking to deep- and quick-freezing; and three fully equipped kitchens giving continuous cooking demonstrations.

The show will be open from noon to 8 p.m. on the first day and from 10 a.m. to 8 p.m. thereafter. Price of admission is 3s.

Industrial chemistry survey

"Achievements of Industrial Chemistry" is to be the theme of the 75th annual meeting of the Society of Chemical Industry in London next year.

The nature of the lectures will be such as to enable speakers to review the major advances brought about by the work of industrial chemists in the last 25 years, and to look forward over the next 25 years to the centenary of the Society.

Baking research praised

The research effort of the baking industry was praised by the Minister of Agriculture, Fisheries and Food, speaking at the annual luncheon of the British Baking Industries' Research Association in London last month. Mr. Heathcoat-Amory said he was a convinced believer in research and he would like the nation to spend more on it.

The Minister said that, in his view, Britain was among the best fed of all nations, not excluding the U.S., and food prices compared very favourably with those in other countries.

He concluded with a reference to food hygiene, saying that a great deal more must be done in this country to ensure cleanliness in the processing, preparation, packaging and handling of food. A special effort was needed in food shops.

The luncheon was attended by many members of the association and their guests, many of whom were mentioned by the chairman of the association, Dr. R. T. Colgate, in his speech introducing the Minister.

Before lunch the annual general meeting was held, followed by a series of technical papers given by senior members of the research staff. During the afternoon the staff were available to discuss individual problems with members. A summary of the association's annual report is given elsewhere in this issue.

Erections and Extensions

A new £50,000 factory is being erected at Romford, Essex, for **Specter's Ltd.**, manufacturing confectioners, Chant Road, Stratford, London, E.15.

*

A two-acre site on the trading estate off Newmarket Road, Bury St. Edmunds, Suffolk, has been acquired by **Van Melle**, of Rotterdam, Holland, for the erection of a new factory to manufacture chocolate and confectionery. The factory will employ 100 workers.

*

New extensions are being constructed at the ice cream depot of **Eldorado Ice Cream Co., Ltd.**, in Mytton Street, Manchester.

*

John F. Renshaw and Co., Ltd., almond specialists, Locks Lane, Mitcham, Surrey, are planning to erect new extensions to their factory.

*

Gillman and Spencer, Ltd., cereal millers, Mayflower Street, Bermondsey, London, S.E.16, plan to erect a new silo at their premises.

*

Meyer Dumore Bottlers' Equipment, Ltd., have plans in hand for the erection of new extensions to their factory in Abbey Road, Park Royal, London, N.W.10.

*

R. H. Filmer, Ltd., folding box manufacturers, plan to carry out extensions to their factory in Wenlock Road, Holloway, N.7.

*

Buchanans Flour Mills, Ltd., are having a grain silo erected at Dock Road, Wallasey, Cheshire.

*

A new factory is under construction at Venetia Road, Birmingham, for **Greville Tinners, Ltd.**

*

Canned peas cheaper

Reduced prices of marrowfat peas have been announced by Crosse and Blackwell Ltd. The suggested retail price per tin ranges from 8d. (old price 9d.) for the A1 size, to 1s. 1d. (old price 1s. 2d.) for the A2 size.

Smedleys, who recently cut the prices of their quick-frozen apple fritters and cauliflowers, have reduced the prices of their processed peas from 5d. per doz. on the smaller sizes to 10d. per doz. on the larger cans. The 8 oz. and 10 oz. cans have been reduced from 6s. 3d. to 5s. 10d., and 7s. 1d. to 6s. 8d. per doz. respectively; and the 16 oz. and 20 oz. sizes from 10s. to 9s. 2d., and 11s. 8d. to 10s. 10d. respectively.

OBITER DICTA

● Codfish Buys Cuban Sugar. —*Headline in Evening Standard.*

● Some people rather like to chew string.—*Lord Chief Justice Goddard.*

● Court Decides That Whale Is Neither Fish Nor Meat.—*Norwegian Newspaper.*

● I should like to persuade our shareholders to patronise their own hotels.—*Chairman of catering firm.*

● No cool beer is served in London unless you are prepared to buy "Un-British."—*Complaint in The Times.*

● We turn from cook into gracious hostess by taking off our apron and dishing up canned peas. — *Siriol Hugh Jones in Sunday Times.*

● My cat, who is 12 years of age, eats a pound of fish every day. This means that, so far, he has consumed nearly 2 tons of it. —*Letter to Sunday Express.*

● Imprison the grape in a bottle and, when you release him after doing his sentence of so many years, he comes out impressive and cosmopolitan as a genie. —*The Times.*

● The sausage was once a mystery and it still seems to be a mystery. But one that contains less than 50 per cent. of meat can hardly be described as a sausage.—*Chairman of the Sunderland Magistrates.*

● Many restaurants are equipping themselves to serve food specialities, including the Béké, which will put on a weekly pig-killing festival supper. — *Hungarian government hand-out, "Gayer Budapest."*

● I think the clothes of the future will be as simple as possible. Bodies will be so beautiful by then with all these rejuvenation pills and vitamin tablets that the last thing we'll want to do is to cover them up.—*American lady fashion expert interviewed in News Chronicle.*

● Over 200 teen-agers mobbed Johnny Ray when he visited Lyons Coventry Street Corner House. After eating a Wimpy hamburger, washed down with a bottle of milk, he said: "These Wimpys are sure good!" Afterwards the teen-agers scrambled for the empty milk bottle.—*Lyons press release.*

New way to make cake

A new cake-making technique based upon the whipping properties of glyceryl monostearate emulsion in the presence of eggs, sugar and flour has been introduced by Advita Ltd. The technique is claimed to considerably reduce manufacturing time, while the finished products have excellent volume, fine texture, a soft, moist crumb, and "remarkable keeping qualities." The new technique, for which a patent has been applied, has been developed by Burdett Bros. (Grays) Ltd., on behalf of Advita.

Change of address

Griffin and George announce that all London and Southern Counties orders, enquiries and correspondence will now be dealt with from their recently extended offices and warehouse at Alperton, Middlesex. The Griffin and Tatlock division at Kemble Street, Kingsway, W.C.2, has now been closed.

Forthcoming Meetings

The Chemical Society

December 5. "Recent Advances in the Vitamin D Field," by Prof. B. Lythgoe, 7.45 p.m., The Queen's University, Belfast. Joint meeting with the R.I.C. and the S.C.I.

Society of Chemical Industry

Food Group

December 14. "Nutritional Requirements and Food Fortification, 2: Vitamins of the B Group," by H. M. Sinclair, A. M. Copping and J. B. M. Coppock, 6.30 p.m., Rooms of the Linnean Society, Burlington House, Piccadilly, London, W.1.

Microbiology Group

December 8. "The Formation and Utilisation of Acetic Acid by Strains of Acetobacter Occurring in Malt-Vinegar Acetifiers," by J. Singh, A. N. Hall and T. K. Walker; "Morphological and Biochemical Changes Induced by Certain Acetobacter Species by Modification of the Conditions of Cultivation," by H. B. Wright, R. Steel and T. K. Walker; "Vinegar Making in Practice," by G. W. Hyde, 6.15 p.m., Medical Society of London, 11, Chandos Street, Cavendish Square, London, W.1.

Institute of Packaging

December 12. "Packaging for the Retail Store," by E. H. Dickens, 6.30 p.m., Old Nag's Head Hotel, Manchester.

December 12. "Package Testing," by F. A. Paine, 6.30 p.m., The Exchange Hotel, Liverpool.

COMPANY PROFITS AND PROSPECTS

Smedley's reap benefits of modernisation

The Smedley Group's programme of modernisation and extension, initiated last year, has now almost been completed for the time being, announced Mr. Wallace V. Smedley, chairman, at the annual meeting of the National Canning Co. Ltd. recently. During the year £516,740 has been spent on capital extensions and modernisations, including substantial extensions to the factory buildings at Wisbech, Spalding and Faversham. New plant has replaced old equipment at most factories "on a massive scale." Additional lines of machinery have been installed, particularly at Spalding, Faversham, Evesham, Wisbech and Paddock Wood. All this work was started last winter and completed during May and June of this year.

Speaking of the rebuilding of the Group's Blairgowrie factory (described in FOOD MANUFACTURE, September, p. 366), Mr. Smedley said that the new factory is much easier to supervise and operate than the former buildings.

The advantages of the modernisation programme—greater and cheaper production—began to be felt in July, particularly when, as a result of the heat wave, a normal six-week fresh green pea season was condensed into little more than three weeks' work.

In the past year both production and sales increased by over 24% and kept in step one with the other. Mr. Smedley warned that with increasing competition, which is now very intense in the canning trade, profit margins have tended to diminish. Disappointing results from the company's partly owned subsidiary, Jersey Canning Co. Ltd., due to last year's poor tomato crop, and the fire at Blairgowrie which put that factory out of production for nine months, had not made the year an easy one, but much had been accomplished. Trading profit for the year amounted to £545,390 against £555,685 last year. The net profits after providing for taxation rose to £311,864, an increase of approximately £30,000 compared with the previous year.

Allied Bakeries' higher profits

In spite of increased competition resulting from the removal of all controls over foodstuffs and a decline in the demand for bakery products, the group net profits of Allied Bakeries Ltd. rose by almost £361,000 to £4,884,076 during the year ended April 2, 1955, compared with £4,523,994 for the previous year.

Dividends totalling 22½% (same) on the Ordinary capital have been paid.

The consolidated net profits of Weston Foods Ltd., whose equity is held by Allied Bakeries, amounted to £881,414 (£982,122) for the year after all charges, including depreciation of £177,337 (£171,317). An interim Ordinary dividend of 45% (same) was declared.

APPOINTMENTS AND RETIREMENTS

MR. RICHARD BLAKE has been appointed chairman of the Australian Egg Board. Mr. Blake, who is 52, was formerly London representative of the Board, which office he has held since 1952. He was responsible for the negotiation of frozen egg-pulp contracts with the Ministry of Food in London between 1950 and 1952.

*

MR. PHILIP A. SINGLETON has resigned from the Board of Monsanto Chemicals Ltd. in order to take up a new appointment with Monsanto Chemical Co., St. Louis, U.S.A. MR. D. R. MACKIE, commercial director, has been appointed acting managing director of Monsanto Chemicals. Mr. Mackie joined Monsanto in 1924. He became sales manager in 1942, was appointed to the board of directors in November, 1952, and in December, 1953, became commercial director of the company.

*

MR. H. W. KING was elected president of the Purchasing Officers' Association for 1955-56, at the recent Cliftonville conference. Mr. King, as national hon. secretary, played a vital part in the Association's reorganisation 11 years ago when its fortunes were at a very low ebb and its membership was less than 500. Since those days, he has held every other major office in the Association, whose membership is now nearly 4,000. Mr. King is the purchasing director of Eburite Corrugated Containers Ltd.

*

MR. DONALD G. SOUTHWELL has been appointed meat-sales manager at the Godley, near Manchester, factory of T. Wall and Sons (Meat Products), Ltd.

Mr. Southwell's appointment coincided with the opening on November 11 of the firm's new meat-products factory at Godley—one of the largest of its kind in Britain (see p. 516).

Mr. Southwell, who is 44, has served since the war as ice-cream sales manager for the South-Eastern England division of T. Wall and Sons (Ice Cream), Ltd., based at Croydon. He joined Wall's in July, 1935.

SIR BERNARD KEEN, D.SC., F.INST.P., F.R.S., has been appointed scientific adviser to Baird and Tatlock (London) Ltd. Until recently he was Director of the East African Agriculture and Forestry Research Organisation.

*

MR. W. C. NICHOLSON has been appointed sales manager at the Park Royal marketing headquarters of T. Wall and Sons (Ice Cream), Ltd. MR. C. D. CORRIS succeeds him as sales manager at the Godley (East) divisional headquarters at Hyde, near Manchester, and MR. D. W. BARCLAY is appointed sales manager at the firm's South Eastern divisional headquarters at Croydon.

*

Obituary

MR. ALBERT E. WHYMAN, Chairman and Managing Director of E. W. Bliss (England) Ltd., died on November 8. Mr. Whyman's association with the company covered a period of ten years, and his loss is keenly felt by his colleagues, the staff and the workpeople.

Fish canner—tennis champion

Mr. C. W. Banks, chairman and managing director of British Fish Canners Ltd., in partnership with Mr. T. A. Heron, holders of the North of England Veteran Doubles Lawn Tennis Championship for the past ten years, won the "All England" Veteran Doubles title at Eastbourne recently.

Having won the fifty-guinea silver salvers presented by Eastbourne Corporation in 1952 and 1953, these trophies now become their own property.

Bush chairman at royal reception

While visiting the British Trade Fair in Copenhagen, where his company was exhibiting, Mr. Eric Bush, chairman of W. J. Bush and Co. Ltd., was among those privileged to be presented to the Duke of Edinburgh at an informal reception aboard the Royal Yacht *Britannia*.

Mr. Bush was also among the guests at the F.B.I. dinner at the Hotel d'Angleterre. This dinner, which marked the end of the exhibition, was honoured by the presence of the Duke of Edinburgh and members of the Danish Royal Family.

Milk Board members visit works

A party of fifteen senior members of the Milk Marketing Board, including the chairman, Mr. T. Peacock, and vice-chairman, Mr. W. R. Trehane, visited the works of the A.P.V. Co. Ltd. at Crawley, Sussex, recently.

The sheet metal department of the new factory.

Braby's Crayford Works

Competitors and customers were among the 600 guests invited by Fredk. Braby and Co. Ltd. to look over their new factory and administration buildings at Crayford recently. The new works and offices cover nearly 12 acres and employ about 900 people. They have been laid out so that materials enter the stores at one end, either by road or rail, then pass through the various manufacturing processes and finally arrive in the dispatch department. Both the receiving and dispatch departments are connected to railway sidings and are equipped with overhead cranes. Mechanical handling equipment for the food and canning industries is produced in the G.C. Engineering department. Specialised drying ovens and canning plant for the food industry are also designed and manufactured. A sheet metal department, a perforating department installed with machines ranging from 350 ton presses to small fast-running presses, and a galvanising department also form part of the works.

BOOKLETS RECEIVED

★A link valve installed in a sugar factory which handles molasses every 45 sec. for 24 hr. a day is one of the new machines described in Hopkinsons Ltd.'s *Bulletin of Recent Developments*. Other new developments described include an electrically-operated soot blower and the *Nolos* slide valve trap, recommended for duties where a continuous discharge of condensate is preferred, for superheated steam mains and all drainage purposes using a closed system.

★A chocolate beating machine, steam-jacketed caramel mixing machines and a Swiss-made machine for wrapping biscuits are illustrated in a recent issue of J. H. Fenner and Co.'s house journal, the *V-Belt Journal*. All the machines, which are in use at the new Brooke Bond chocolate factory at Burnley, are using Fenner Belts. A short article describes the manufacture of chocolate biscuits at the factory and the action of the machinery.

★The advantages of nitrogen as a protective atmosphere for food packaging, chemical storage and other purposes are outlined in a leaflet produced by the Incandescent Heat Co. Ltd. The *HI-Nitrogen* generator — a self-contained combustion method unit for cheap production of nitrogen from a mixture of air and fuel gas is described.

★Newman Neame Ltd. have designed and produced an interesting and variously illustrated account of the work of Chappie Ltd. of Melton Mowbray, manufacturers of cat and dog foods. "Cats, Dogs and Diets" is designed for circulation among veterinary surgeons and students, and distributors of pet foods, with the object of promoting the company's products. The text is supplemented by an extensive use of photographs of whaling at sea, factory operations, and various breeds of cats and dogs. The book also gives extracts from a census of the cat and dog population of Great Britain, and two pages of silhouettes analysing the comparative popularity of various breeds of dogs.

The contents are divided into five chapters. There is a foreword by Captain T. L. Wright, M.R.C.V.S., Hon. Veterinary Surgeon to H.M. The Queen. The first chapter deals with the company's emphasis on scientifically balanced and attractive animal diets. The next two chapters describe the chief ingredients of the company's pet foods — liver, whalemeat, herring and whitefish—and how these are obtained and hygienically processed in the company's factory. This is followed by a review of the laboratory and consumer research undertaken to ensure the highest level of quality and acceptability for their products. The final chapter is devoted to general notes on the feeding of pets.

★Private BTU—a sort of Mr. Cube of the boilerhouse—figures prominently in a new booklet put out by the National Industrial Fuel Efficiency Service, and entitled "Fuel Efficiency Pays." The booklet shows a factory layout, presented diagrammatically before and after modifications which reduced the coal consumption from 95 to 24·2 tons per week.

★A representative range of standard acid-proof chemical and industrial stoneware products is presented by Doulton and Co. Ltd. in their new general catalogue. Special shapes and sizes to meet individual requirements are also available from the company. The catalogue sets out the advantages of the stoneware, which include resistance to all acids and corrosive chemicals except hydrofluoric acid and hot, strong caustic alkalis, mechanical strength and ease of cleaning.

★Recipes for nougat, chocolate and confectionery centres, fondant, foam work, marshmallow, wafer fillings, and caramels, are all set out in a new booklet produced by Lenderink and Co. N.V. of Schiedam, Holland, to publicise their whipping agent *Hyfoama*. Apart from recipes, the booklet includes technical hints on the production of specific preparations and on confectionery production in general.

"Your Daily Delivery"

This is the title of a sound film of one of the most modern dairies in the world, that of Express Dairy Co. (London) Ltd., at South Morden. The film has been produced in conjunction with Express Dairy by Dawson Brothers Ltd., the engineers, of Ventnor Works, Gomersal, near Leeds.

Running for 20 min., the film shows bottle washing, filling and capping, and automatic decrating and recrating.

Copies are available from Dawsons.

OVERSEAS ENQUIRIES

South Africa: Confectionery

M. J. Jacobson (Pty.) Ltd., 49-51, Sauer Street, Johannesburg, wish to represent British confectionery manufacturers.

Interested manufacturers should write direct to M. J. Jacobson (Pty.) Ltd., at the same time notifying the U.K. Trade Commissioner, P.O. Box 10101, Pritchard House, Pritchard Street, Johannesburg.

*

British Guiana: Fats

Sterling Products Ltd., 29, Main and Holmes Streets, Georgetown, British Guiana, propose to commence the production of margarine, lard compound and shortening early in 1956, and would be glad to hear from U.K. manufacturers of the raw materials, packaging, etc., used in their processes. They are considered to be a suitable connection for British firms.

Interested manufacturers should write direct to Sterling Products Ltd., at the same time notifying the U.K. Trade Commissioner, Colonial Building, South Quay (P.O. Box 225), Port of Spain, Trinidad.

*

U.S.A.: Foodstuffs

Granadaisa Foods Inc., Bush Terminal Building No. 1, 269, 37th Street, Brooklyn 32, New York, wish to find sources of supply in the U.K. of canned kippered herring, hard candy, biscuits, jams, preserves and marmalades and other kindred lines.

The firm are thinking of paying up to 75% cash against documents for foodstuffs supplied to them, the rest to be on an extended credit basis of up to 90 days, to cover the sale of the goods. In this way they are envisaging something in the nature of a partnership where both the British firm and themselves carry a proportion of the risk. They would want an exclusive arrangement for the whole of the U.S.

Interested suppliers should write by air mail direct to Mr. E. H. Jacobsohn of Granadaisa Foods with full details of their offers; any prices quoted should be c.i.f. in U.S. currency. They should at the same time send a copy of their initial correspondence to the British Consulate-General, 99, Park Avenue, New York 16, N.Y.

*

Pakistan: Butter and cheese making plant

Model Dairies Ltd., 23, Nicholson Road, Lahore, wish to contact British firms who can supply them with the following:

Complete small capacity plant for producing canned butter, together with a canning plant of equal capacity, and D.C. electric motors. New or reconditioned machinery is acceptable.

Pilot plant for the manufacture of hard cheeses, consisting of a curd tank of 100 lb. capacity, with knives and a curd mill. No presses or hoops are needed. Again new or second-hand equipment will do.

Interested suppliers should send quotations and literature direct to Mr. Maqsood, one of the directors of Model Dairies Ltd. Mr. Maqsood says that the prices of U.K. dairy equipment were as a rule much higher than those of Danish and German manufacture. British firms should, therefore, bear this in mind when quoting.

Responding firms should notify the U.K. Trade Commissioner, National House, Bank Square, The Mall, Lahore, of action taken.

*

Colombia: Whisky

Laboratorios Picot S.A., Calle 46 No. 46-117, Barranquilla, are interested in acting as distributors for a British distiller of good quality whisky. They are considered to be a suitable connection for British firms.

Interested exporters should write direct to Laboratorios Picot S.A., at the same time notifying the British Consulate, Edificio Banco Commercial Antiogueno, Calle 34, No. 43-70, Barranquilla, that they have done so.

*

India: Packing, filling and sealing machinery

C. Doctor and Co. Ltd., P.O. Box 979, Bombay 1, wish to import from Gt. Britain automatic packing, filling and sealing machinery for the manufacture of liquid glucose, glucose powder and corn steep liquor. They are considered to be a suitable connection for U.K. firms.

Interested manufacturers should send full details of their machinery, including illustrations, specifications, price ranges, possible dates of delivery, etc., direct to C. Doctor and Co. Ltd., at the same time notifying the U.K. Trade Commissioner, P.O. Box 815, Mercantile Bank Building, Mahatma Gandhi Road, Bombay, No. 1.

*

Formosa: Rice-bran oil extraction machinery

The Fu-Hwa Tire Cord Works, 7, Tsinan Road, 1st Section Taipei, Taiwan, has called for tenders for the supply of machinery for a rice bran oil extraction factory. In addition to the machinery they need one edge runner for breaking the bean cakes into powder form so that the solvent may easily penetrate into oil cells. The amount of raw material to be treated per hr. is 600 kg. of rice-bran.

The purchase will be financed under the International Co-operation Administration, the agency through which the U.S. Government gives economic and technical assistance to under developed countries. Interested suppliers should submit offers directly to the buyer.

*

U.S.A.: Fish and confectionery

Mr. C. P. Bennet, 2845, Polk Street, San Francisco 9, California, would like to get in touch with British exporters of canned and/or smoked fish, toffee and other confectionery in bulk. Mr. Bennet is a British subject long resident in San Francisco. He is an agent and importer and is considered to be a suitable connection for U.K. firms.

Interested exporters should write by air mail direct to Mr. Bennet with full details of their offers and c.i.f. quotations in U.S. dollars, at the same time notifying the British Consulate-General, 2516, Pacific Avenue, San Francisco 15, California.

*

Bahrain: Frozen and canned foods

Mr. Ghulum Akhtarzadeh, proprietor of Moon Stores, Manamah, Bahrain, wishes to import frozen and tinned foodstuffs and wheat preparations from Gt. Britain. Normal terms are irrevocable letter of credit. The customs duty on foodstuffs is likely to be 5% *ad valorem*. Moon Stores are considered to be a suitable connection for United Kingdom firms.

Interested exporters should write direct to Moon Stores with full details of their offers and quoting prices c.i.f. Bahrain, at the same time notifying the Commercial Secretariat, British Political Residency, Jufair, Bahrain, that they have done so.

*

Hong Kong: Whisky

Richard Hua and Co., 103, Victory House, Wyndham Street, Hong Kong, are interested in representing British manufacturers of whisky. They are considered to be a suitable connection for British firms.

Interested manufacturers should write direct to the Hong Kong firm, at the same time notifying the U.K. Trade Commissioner, 943-948, Alexandra House, P.O. Box No. 528, Hong Kong.

*

Turkey: Poultry processing and packaging equipment

The Meat and Fish Organisation, Selanik Caddesi 78, Ankara, Turkey, has called for tenders for the supply of equipment for a poultry farm and poultry processing, eviscerating and packaging plant.

The purchase will be financed by the International Co-operation Administration, the agency through which the U.S. Government gives economic and technical assistance to under developed countries.

Interested exporters should write direct to the enquirer.

Food News Overseas

Danish factory for Ceylon

A ham and bacon factory, in which it is reported that Rs.3 m. of entirely Danish capital has been invested, is starting production in Ceylon. The output of the factory, which is located on a site near Nuwara Eliya in the hill country, is expected to be some 14,000 lb. of ham, bacon and sausages weekly.

New orange drink

A new non-alcoholic drink, *Orange Pak*, has been marketed in Eire by Central Dairies (Dublin) Limited, in association with Northern Dairies, Hull, manufacturers of *Flash Orange*. The drink is made from imported oranges and Irish beet sugar and is said to have a longer shelf life than is usual with this type of drink.

Nairobi margarine factory

High grade margarine is to be produced and sold under the name *Blue Band* by a Nairobi company of which the shareholders are the Kenya Government, the Colonial Development Corporation and Unilever. Production from the £120,000 factory is expected to begin by the end of this year and will approximate 6,000 tons annually. The necessary vegetable oils will be chiefly obtained from East African sources.

Record dairy production in Australia

Australian milk production during the exceptionally favourable season of 1954-55 amounted to 1,322 million gal. —the highest ever recorded—according to the Commonwealth Economic Committee. The figures for the previous season were exceeded by 11%. Virtually the whole of the increase was used to make butter, as less was required for cheese and preserved milk. The output of creamery butter at 188,000 tons was 20% greater than in the previous year and the highest since 1939-40. A decline in the production of cheese, condensed milk and whole milk powder reflected the lower prices of these commodities, but the upward trend in output of skimmed milk powder was maintained. Slightly more buttermilk and whey powder was produced than in 1953-54.

The increase in production raised exports of butter to 62,500 tons, the highest since 1949-50, the last season before butter rationing ended, but well below the 1938-39 figures of 102,474 tons. Most of the total exports went to the U.K., but there were no shipments to Russia or to Western European countries. Increased exports to Malaya and Singapore were offset by lower trade with other Commonwealth countries.

The first shipments of Australian butter and cheese to be imported on private account arrived in the U.K. in September. Shipments at the end of the month totalled 3,034 tons of butter and 60 tons of cheese; over two-thirds of the butter is on the account of the Australian Dairy Produce Board, to which nearly all future shipments will be consigned for sale by its appointed agents.

Norwegian filleting plant may become world's biggest

The fish filleting plant at Hammerfest, North Cape, Norway, is being extended. The aim is to achieve an annual production of 25,000 tons of filleted fish. The plant, claims the director, Johan Holst, will then be the biggest of its kind in the world. At full production, the plant will employ 1,000 men, as against 360 now, and another 600 to 700 will be employed on a fleet of trawlers to supply the plant with fish. Mr. Holst says that with the expansion of the filleting plant it is not unlikely that the population of Hammerfest can be trebled in the next five to six years. Hammerfest—the most northerly town in the world—can, he says, become "a new Grimsby."

Roquefort cheese for Rhodesia

A cheese factory has been incorporated in a new dairy built recently at Gatooma, Southern Rhodesia. The factory is the only one of its kind in the Federation to manufacture Roquefort cheese, and at present 400 lb. a day are being made. It is hoped that eventually the Gatooma factory will be able to supply all requirements of this type of cheese for the Federation, thus saving imports.

Soya bean milk for Java

A full-scale soya bean milk plant is shortly to be opened at Djokjakarta in Central Java by the Indonesian Government with the help of F.A.O. and the United Nations Children's Fund. Milk is already being produced in limited quantities at a pilot plant in Djakarta, and is being used for palatability trials.

World olive oil talks

Work on an international agreement aimed at stabilising the world market in olive oil was completed in Geneva recently by a special conference held by the United Nations.

The agreement, which consists of some 30 articles, calls for the creation of an olive oil council and an international olive oil fund with a view to stabilising the market and reducing the differences in international supply and demand caused by crop fluctuations.

Next dietetics congress planned

An international food fair has been planned to take place during the second International Congress of Dietetics to be held at the Esposizione Universale, Rome, from September 10 to 14, 1956. The programme consists of four main sections: recent findings of nutritional research, methods of education in nutrition, principles and problems of feeding large numbers of people, and problems of training dietitians. The British Dietetic Association, 251, Brompton Road, London, S.W.3, is represented on the organising committee.

Jamaica demands enriched flour

All wheat flour imported into Jamaica must now be enriched with a minimum of the following (mg. per lb.): thiamine,2; riboflavin, 1.2; niacin, 16; and iron, 13.

Before the Jamaican Government abandoned the bulk purchase of flour in July 1954, all flour supplies were enriched. Since imports have returned to private channels, much of the flour entering has not been so enriched, and the government, on the advice of the Nutrition Committee, has decided to make enrichment an official requirement.

Sugar refinery for Ceylon

The establishment of a sugar refinery has been sanctioned by the Government of Ceylon. The refinery will be located in the Colombo area and will process imported raw sugar. It is to be run by a Ceylonese-American combine. The Government will participate up to 10% in the venture but the syndicate will finance the cost of setting up the project. The combine has also been granted one year in which to survey the possibility of establishing a sugar plantation and a raw sugar factory.

Pork and pregnancy

The " old wives' tale " that pork is unsuitable for pregnant women and lactating mothers is rebutted by the American Meat Institute in advertisements published in the medical press and in popular journals. Statements made in the advertisements, which claim that pork supplies a high quantity of the nutrients required by the maternal organism during these periods, have been reviewed and found consistent with current medical opinion by the Council on Foods and Nutrition of the American Medical Association.

Future food prospects in Lebanon

Although there is at present little demand for food preparing machinery in Lebanon, increasing interest in the industry may lead to considerable sales within the next few years, reports the Export Services Branch of the Board of Trade. For example, a number of people are seeking small trawlers to fish off the Mediterranean coast: if this develops as an industry, it may well not only satisfy local demand but provide sufficient raw material for the establishment of a small export industry in canned fish in the Middle East. There is also a growing realisation of the value of Lebanese fruits, which could lead to an increase in the canning of apples, peaches, mandarines, etc.

There is at present a market for sausage filling machines and for abattoir equipment. There is also a small market for coffee bean roasters and grinders and a moderate market for cooking fat processing plants.

" Puffed " tomato powder

" Puffed " tomato powder may soon become a commercially available product. The batch-type vacuum-drying operation for its production has now been adapted to commercial continuously acting vacuum drying equipment by the Western Utilisation Research Branch of the U.S. Dept. of Agriculture. The powder produced by the new vacuum drying method is said to mix readily with water and to have natural tomato colour, flavour and nutritive qualities.

Two types of concentrate were used in the continuous process tests. One was prepared from canned tomato juice and the other from a commercial high-pectin tomato paste. The former was concentrated in laboratory equipment at a product temperature not exceeding 160° F. and was about 40% solids. The paste was 30% solids. Commercially feasible drying conditions and rates were found for both and both were dried to light flaky powders containing only 1½% to 2% moisture without perceptible heat damage. Some differences in the characteristics of the two powders were apparent.

The Leonard Hill Technical Group this month

Manufacturing Chemist.—Extraction of Cholesterol from Wool Wax Alcohols; Silicones in Polishes; Vanillin; International Process Licensing; Industrial Safety; Progress Reports: Hormones, Analytical Chemistry, Antibiotics; Annual Index.

World Crops.—Grain Storage in Tropical Climates; Mobile Suction Pneumatic-Conveyor Units; Yugoslav Agriculture, 1954; Developments in Danish Agriculture during Post-war Years.

Dairy Engineering. — Report from the Dairy Show; Six Million Ices a Day; Ice-Cream Production and the Dairy Engineer; Heated Words from the Ice-Cream Conference; Linings for Mild Steel Milk Tanks.

Fibres.—Society of Dyers and Colourists Symposium, 2; Fibre Rope: Safety Codes of Working; Vehicle Operation in the Fibres Industries; 5,000 Years of Fibres and Fabrics.

Chemical and Process Engineering. — India's Chemical Industry—A New Phase; Chemical Engineering Reviews: Filtration, High Vacuum Technique; The Long-Term Aspect of Fission Product Disposal; Hungary's Big New Fertiliser Works.

Corrosion Technology.—Electrical De-aeration of Feedwater; Corrosion Studies Aid Light Metals; Selection of Bolt Materials for Underground Service.

Paint Manufacture.—Stearates for the Paint Industry, 1; Fundamental Properties; The Evaluation of Aluminium Pigments, 2; Isocyanates for Surface Coatings; Particle Size.

Building Materials.—Sanitary Fittings; Adhesives for Hardboard and Insulating Board; Plastic Film as Moisture Barrier; Expansion of Granite.

Muck Shifter.—New Tunnel for New York's Traffic; Explosives for Precision Work; The Use of Electro-Osmatic Soil Stabilisation.

New vanilla product

A new powdered vanilla product, based on natural vanilla extractives reinforced with aromatics and possessing unusual fixative values, has been marketed by Dodge and Olcott, Inc., with the name *Sucranilla*. Long shelf life can be expected in products such as dry puddings, desserts, and cake mixes, and it may also be used advantageously in flavouring powdered milk drinks and ice cream.

Rome food congress

Productivity in food distribution will be the general theme of the Third International Congress on Food Distribution, to be held in Rome from June 18 to 22, 1956. Subjects for discussion will include the evolution of the distribution structure; promotional techniques, including public relations and the development and influence of technical literature dealing with food; co-operation between commerce, agriculture and industry, and the duties of the distributor towards the consumer. Technical exhibitions illustrating modern sales techniques and an industrial sample show will be held.

Fruit pie fillings demonstrated

A demonstration on the use of real fruit pie fillings, a product of Margett's Preserves, Ltd., was given in Dublin recently.

Among the advantages of the fruit fillings, pointed out by Mrs. Anthony, the company demonstrator, was the fact that after the tin of fruit was opened, it could remain half-full in a refrigerator for about a fortnight and still remain wholesome. Another advantage was that the juice of the fruit did not soak through the pastry, because of an apple base that was put into each tin of fillings. The full flavour and colour of the fruit was retained during manufacture, it was pointed out.

Fishing industry research institute expands

The present offices and laboratories of South Africa's Fishing Industry Research Institute are overcrowded, and tenders for a new building will be called for, announced the director, Dr. G. M. Dreosti, recently.

By the end of next year a new £55,000 building which will house the institute will have been built behind the Jameson Hall of the University of Cape Town. The building will have offices and laboratories in the front—there will be research laboratories for chemistry, physics, bacteriology and engineering. Behind this section of the building there will be a pilot plant laboratory and then sections devoted to special research—fishmeal, canning, fresh fish, smoking, salting and drying. There will also be experimental cold stores, incubation rooms and animal houses for the rats which are used in feeding experiments.

Among the problems which the institute is tackling now is the spontaneous combustion of fishmeal. While in store and while being transported, fishmeal is liable to heat up and burn. The institute is working on a method of storage and transportation which will prevent this.

Most of the fishmeal produced is for cattle food. South Africa exports more than half the fishmeal produced to the U.S.A., Gt. Britain and Europe.

Food Packaging

Packeted yeast food for bakers

Envelopes of *Merbro* concentrated yeast food and bread improver are being produced by U.P.M. Ltd. Each pack is sufficient for one sack of flour. The packaging material used is polythene-coated paper which has been printed by the Metal Box Co. Ltd., and supplied in reel form to Ivers-Lee (Great Britain) Ltd., who make up and fill the envelopes.

New tapes dispenser

All types of self adhesive tapes from standard cellulose to the heaviest grades of P.V.C. on varying core sizes can be dispensed by the new *Transotaper Major* made by John Gosheron and Co. Ltd. Only one spindle is needed for all types of tape but for extra speed additional spindles may be bought if required. The blade is straight-cutting with a safe, automatic spring action guard.

Film-wrapped poultry

Turkeys and chickens, wrapped in transparent film, were on display at the exhibition held in conjunction with this year's Poultry Conference, on a joint stand operated by British Cellophane Ltd. and Colodense Ltd. British Cellophane are the manufacturers of *Cellophane* and B.C.L. polythene, while Colodense print and convert these films into bags, reels and wrappers.

The birds, whole and in portions, wrapped in *Cellophane* or B.C.L. polythene, were displayed in a refrigerated cabinet, and literature, distributed from the stand in handsomely printed polythene bags, included a leaflet specially prepared for the occasion entitled "Packaging for Profit," which described the advantages of wrapping poultry in film.

Lemonade pockets

A new package has been produced by the Metal Box Co. Ltd., for Symington's Instant Lemonade Powder. It is a pocket made from *Tripolam X. 1*, a heat sealable foil laminate, and is said to be proof against moisture, grease and aroma and to be flavour retaining. The pictorial design of the pocket, which is by Erwin Wasey and Co. Ltd., has been reproduced in four colours—red, yellow, white and green—by photogravure.

Nine tins for Christmas

Nine different tins are available in the Scribbans-Kemp Christmas range—the largest range this company has ever presented.

An outstanding one is the *Antique Casket*, which contains Barker and Dobson chocolates and Kemp's chocolate biscuits. Its charm lies in the fact that it is a reproduction of a French snuff box, in gold and enamel, made in Paris, *circa* 1760-1761. The box has been reproduced from a full colour photograph by Hennell. The original box is in the Victoria and Albert Museum, who have given permission for reproduction.

Another new presentation is the *Family* tin. Designed by Talmadge, it features red, gold and white stripes. Other packs in the Scribbans-Kemp range include the familiar tea caddy—in a red or blue flower design this year—containing chocolate table fingers. The *Georgian* and *Carnation* tins both feature a colour still-life photograph by Hennell.

The *Little Shipwright* pack, too, has a charm all its own. The design is by the Metal Box Co.—who were responsible for the production of this Scribbans-Kemp series.

Display of film-wrapped poultry.

Scribbans-Kemp's Antique casket.

Foil laminate pockets for lemonade powder.

Corrosion test of soft drink cans

A "corrosivity tester" has been announced by the Continental Can Co. Inc. which is claimed to estimate the shelf life of canned carbonated soft drinks.

As described in a paper read to the Institute of Food Technologists at Columbus, Ohio, the tester consists of an insulated box, a multi-point connection panel and a galvanometer. The unit makes it possible to measure the corrosion potential of individual carbonated beverages and so to estimate their shelf-life and to design suitable metal containers for them.

The corrosion in canned soft drinks is of the galvanic type in which two dissimilar metals (*i.e.* tin and iron) immersed in an electrolyte (the beverage) comprise a closed circuit, thus setting up an electrical potential within the can. By establishing a galvanic test system with tin and iron electrodes immersed in a beverage under controlled conditions it is possible to measure the different amounts of current flowing between the tin and iron with the corrosivity tester. This is in effect a measure of the corrosivity, since the electrodes remain the same and the beverage is changed.

In operation, glass jars of the beverage containing iron and tin electrodes are placed in the insulated box and connected to the multi-point panel. Readings are taken from the galvanometer and correlated with the shelf-life of the product.

Trade Marks

APPLICATIONS

FLYING CLOUD.—738,729. Flour. **Price Brothers (Bakers), Ltd.,** Parrott Street, Clayton, Manchester, 11; Merchants.

FRILK.—739,965. Non-alcoholic fruit flavoured drinks consisting principally of milk. **H. W. Carter and Co., Ltd.,** The Royal Forest Factory, Colesford, Gloucestershire; Manufacturers.

GOLDEN DIAMOND.—736,803. Cheese. **A. Mathews and Skailes, Ltd.,** 5, 7 and 9, London Bridge Street, London Bridge, London, S.E.1; Manufacturers and merchants.

GOLDEN GHANA PIGS FEET.—738,467. Pork and pork products for food. **Gilbert J. McCaul and Co., Ltd.,** McCaul House, 142, Piccadilly, London, W.1; Merchants and manufacturers.

DULCI.—B739,096. Non-medicated confectionery. **Dulcet Confectionery Ltd.,** 65/67/69, North Acton Road, London, N.W.10; Manufacturers.

GOLDEN RING.—736,323. Scotch whisky. **John Richdale and Co., Ltd.,** 129, Bramall Lane, Sheffield, 2; Merchants.

GRAIL.—732,701. Canned sardines. **Honrado and Honrado Ltd.** (a joint stock company under the laws of Portugal), Rua dos Caminhos de Ferro, Nos. 28-34, Olhao, Algarve, Portugal; Manufacturers. Address for service c/o Levissac and Co., Ltd., 11-12, Fenchurch Street, London, E.C.2.

GREAT SCOT.—B738,264. Flour. **William Brock and Son, Ltd.,** 13, York Street, Glasgow, C.2; Manufacturers.

RICHER'S.—727,642. Non-medicated sugar confectionery for sale in England excluding in Cumberland, Durham, Northumberland, and Westmorland, and for sale in Glamorganshire. **Addey's Confectionery (Derby), Ltd.,** Chequers Lane, Derby; Manufacturers.

GOLDEN SPARK.—738,078. Fish, meat extracts; preserved, dried and cooked fruits and vegetables, jellies, jams, eggs, milk, dairy products, edible oils, edible fats, meat, fish, fruit and vegetable preserves, and pickles. **Henri Kerbiriou,** Slingsby Place, Long Acre, Covent Garden Market, London, W.C.2; Merchant.

New Companies

Friar's Foods (Blackburn), Ltd. (546532.) Wholesale pie mfrs. £5,000. Dirs. not named. Subs.: J. M. Greenwood and W. H. Crook.

Titanics (Continental Foods), Ltd. (546752.) 26, Bury Old Road, Manchester, 8. £1,000. Dirs.: M. and Jean Hyman.

Weekes Brothers (Merthyr), Ltd. (546756.) 2, Dynover Street, Merthyr Tydvil. Wholesale confectioners. £10,000. Dirs.: C. C. and B. A. Weekes.

Worth Mor Meats, Ltd. (546758.) Spring Mill, Spring Street, Rishton. Cooked meat mfrs. £5,000. Dirs.: W. and Mrs. C. Haworth.

Paramount Tea, Ltd. (546856.) Dyers Buildings, Holborn, London, E.C.1. £1,000. Subs.: N. E. Picking and D. Israel.

Selwyn Lewis, Ltd. (546870.) 26, Oak Street, Manchester, 4. Wholesale fruit and vegetable merchant. £1,000. Dirs.: H. D. Lette and M. W. Wicks.

Chartridge Poultry Packers, Ltd. (546901.) 203, Regent Street, London, W.1. £100. Subs.: E. M. Tew and G. M. Lee.

G. H. Abernethie, Ltd. (546906.) Fish Docks, Grimsby. Fish merchants. £1,000. Dirs.: Mrs. P. and R. Abernethie.

W. R. Butler and Sons, Ltd. (546803.) 61, Brown Street, Manchester. Mfrs., bottlers, merchants and distributors of and dealers in mineral and aerated waters, etc. £15,000. Dirs.: J. H. and J. A. Bowden, Millicent Shaw and H. S. Stafford.

Aucher Supplies, Ltd. (546916.) Mfrs. of and dealers in food and food products. £10,000. Dir.: A. W. Fitz Aucher, 57, Bolton Road, Rochdale, Lancs.

Walter Braund, Ltd. (546978.) 27, Russell Chambers, Covent Garden, London, W.C.2. To take over business of fruit and vegetable salesman and foreign importer carried on by late Walter H. Braund. Dirs.: B. A., W. P. and D. W. Braund.

Griffiths and Co. (Moylegrove), Ltd. (546988.) Carmarthen Road, Fforestfach, Swansea. Bakers, pastrycooks, etc. £5,000. Dirs.: J., D. and I. Griffiths.

Berkex Food Products, Ltd. (547120.) £100. Dirs. to be appointed by subs. Subs.: Jean Herbert and Claire Moore, 156, Strand, London, W.C.2.

Clarinder, Ltd. (547121.) General and mfrs. agents, producers and mfrs. of and dealers in canned goods. £100. Dirs. to be appointed. Subs.: Jean Herbert and Claire Moore, 156, Strand, London, W.C.2.

Hawken and Todd, Ltd. (547062.) Importers and buyers and sellers of meat. £1,000. Dirs.: J. C. Todd, Caia Farm, St. Nicholas, Glam., and H. E. Hawken.

Croydon Tea Co., Ltd. (547047.) 4, Constance Road, Croydon, Surrey. £2,000. Dirs.: J. P. R. Fernandez and L. McKenzie.

J. G. Dring and Son (Sneinton), Ltd. (547161.) General Buildings, Bridlesmith Gate, Nottingham. Wholesale potato merchants and wholesale fruit and produce merchants. £2,000. Dirs.: J. V. and Mrs. M. Dring.

From Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C.2.

COMPANY MEETING

VITAMINS LIMITED

Motherless Piglets reared and sold for £5,000

Vital importance of Vitamin Stability

At the annual general meeting of Vitamins Ltd., the chairman, Mr. H. C. H. Graves, referred to the great loss sustained by their agricultural division (Agricultural Food Products Ltd.) by the untimely death at 53 of Mr. R. Bolton. Hundreds of letters had been received testifying to the affection which he had inspired up and down the country and overseas. There was no possibility of filling this gap by simple replacement. After consultation with his colleagues, Mr. Graves said, he had been asked to accept full executive responsibility for their agricultural company.

Their introduction of Vitamealo *Supercon* represented a great advance in the science and economy of the feedstuff industry, and would help both the compounder and his customer, the farmer. Vitamealo *Supercon* is highly stable, concentrated, dry and free-flowing, is easy to handle and easy to store.

Vitamealo "in the bag" remained the supreme protein-mineral-vitamin supplement. Pigs reared on it continued to sweep the board in both live and (even more important) carcase classes at Smithfield, The Royal, and other major shows.

Their "Permanised" A and D_3 was now the leading product of its kind in the country. It not only set the standard by which others were judged, but its sales considerably exceeded those of the nearest competitor. Many and intricate were the problems of vitamin stability in animal feeds, but their company had a team—unique in this country—with 21 years' experience of just that problem: not merely the problem of vitamin manufacture, but the problem of vitamin *stability*. It was sometimes assumed that if Vitamin A was there, D must be all right. One product had contained precisely 5% of the guaranteed unitage of D_3! No compounder using Permanised A and D_3 need fear such a disaster—importing as it did the risk of grave claims for losses of valuable livestock.

Vitasukla was revolutionising the rearing of "excess" piglets, *e.g.*, piglets for whom the sow had inadequate accommodation, or piglets whose mother had died or lost her milk. One of their customers with a litter of valuable "Landrace" piglets whose dam had died accidentally was faced with a serious loss if he could not rear them. He put the piglets on *Vitasukla* and they were sold for £5,000—not a bad return for a few tins of *Vitasukla*.

Turning from the subject of animal to that of human nutrition, Mr. Graves said that *Bemax* had had a record year. *Bemax* (stabilised Wheat Germ) was still the best-known vitamin-mineral-protein food in the world, a fact that had been appreciated and understood by doctors and dietitians, nurses and mothers for over 25 years. It was incredible to think that, in these days, anyone could be found to deny children its benefits.

The report and accounts were adopted.

Information and Advice

This Service is available to subscribers to Food Manufacture. If a stamped addressed envelope is enclosed replies will be sent by post, but enquiries cannot be answered by telephone.

Marshmallow with good shelf life

B.7531. *We require a marshmallow for use with a chocolate biscuit. It should be fairly pliable and at the same time have a reasonable shelf life of about two to three months. We should add that our marshmallow is made in a fast whipping machine and extruded. In this way we obtain a large over-run against the original mix of somewhere about 5 to 1.* (Slough, Bucks)

We suggest the following formula as a basis for experiment:

Granulated sugar	12 lb.
Liquid glucose	4 ,,
Invert sugar	4 ,,
Powdered gelatine	12 oz.
Water	2 qt.

The following formula is for a slightly more expensive product but with better moisture retention:

Granulated sugar	10 lb.
Liquid glucose	4 ,,
Cerelose powdered glucose	2 ,,
Invert sugar	4 ,,
Gelatine	12 oz.
Water	2 qt.

The cooking temperature of the sugars might be about 238-240°F.

Fish sausages

B.7666. *Between the years 1925-1935 some work was done on the manufacture of fish sausages. Can you give us any references to this subject at this period?* (Cape Town)

Twenty-three years ago in FOOD MANUFACTURE (July, 1932, p. 191) we quoted an American source as reporting that "the famous 'Red Hot' will have a competitor in the form of a fish frankfurter." It was understood that haddock, cod and hake were used for the purpose and that the fish were spiced and smoked. Experiments were taking place to turn out a fish "Bologna sausage," but we have no information on how they turned out.

Apple packing

B.7664. *I am a mechanical engineering student working on the design of an apple packing house, and would like some information about the machinery required.* (Beirut, Lebanon)

The apple packing process normally consists of five operations: conveying of apples, which is usually mechanised; quality grading, which is generally carried out by hand; sizing, which can be mechanised; wrapping and packing; and finishing, all of which are mechanised to some extent. More information can be obtained from Bulletin No. 84, "Apple Grading and Packing," of the Ministry of Agriculture, Fisheries and Food (H.M.S.O., 4s. 6d.), and you would also be well advised to write to the manufacturers of apple grading machinery (names supplied), who would be able to give you fuller information on installation, power requirements, etc.

Wafer biscuits

B.7612. *We would like a recipe for making wafer biscuits which we intend filling with the cream for which you give a formula in* FOOD MANUFACTURE, *August, 1954, p. 336.* (Nicosia, Cyprus)

We suggest the following recipe as a basis for experiment:

Grits	90 lb.
Cornflour	7½ gal.
Unskimmed milk	8 ,,
Water	9 ,,
Syrup (32° Baumé)	1 quart
Yolks	2 quarts
Yellow colour	3 oz.
Red colour	2 ,,
Melted coconut butter	12 ,,

Cream up the flour, milk, yolks, syrup and coconut butter for about 5 min., then add water in three or four separate lots, so as to give a complete beating period of about 15 min. To get sheets which do not soften in the open, place them immediately after baking in tin boxes of the correct size, the lids of which should contain a few ventilating holes. Leave the sheets thus boxed in a drying chamber for 24 hr. at a temperature not exceeding 80-100°F.

Information supplied

The Enquiry Service has dealt with requests for the names of manufacturers and suppliers of plant, machinery and materials and also general information as follows:

B.7621. *Supplier of potato dicing machine.* (London, S.E.15)

B.7622. *Information on International Chamber of Commerce.* (Tabasco, Mexico)

B.7623. *Foreign foods and drugs regulations.* (St. Albans, Herts.)

B.7624. *Suppliers of ultrasonic machinery for grinding sugar.* (London, E.8)

B.7625. *Suppliers of equipment for making roasted peanuts.* (Yaba, Nigeria)

B.7626. *Manufacturers of food preparing machinery.* (Sheffield)

B.7627. *Advice on thickening tomato soup.* (Groningen, Netherlands)

B.7628. *Suppliers of machines for popping corn.* (Oslo, Norway)

B.7629. *Suppliers of pre-digested starch.* (Manchester)

B.7630. *Manufacturer of filtration equipment.* (Nachlat-Izlak, Israel)

B.7631. *Information on processing fruit juices.* (Solihull, Worcs.)

Recent Patents

COMPLETE SPECIFICATIONS ACCEPTED

736,861. GENERAL ELECTRIC CO., LTD.: Electric ovens.
736,010. A. S. TOMS LABORATIUM: Production of small pieces of chocolate.
737,173. DAWSON BROS., LTD.: Loading mechanism of washing machines for bottles, jars, canisters and other hollowware.
741,086. HAYLE ENGINEERING CO., LTD., and R. T. HAMILTON. Milk churns and similar containers.
741,087. SATONA, LTD., and T. N. GAUNT. Manufacture of cartons.
740,914. A. T. E. BINSTED, F. ABDELA and B. N. C. MOSS. Butter and like spreading machines.
741,076. GENERAL FOODS CORPORATION. Pudding compositions and process of preparation.
740,870. N.V. BRONSWERK. Apparatus for sterilising or pasteurising the contents of bottles or similar containers.
740,958. GENERAL FOODS CORPORATION. Culinary mixes.
741,222. O. CUPPER. Method and device for cutting and slicing onions.

Patent abstracts are from the "Patent Abstracts Journal" published by the Technical Information Co. and are published by permission of the Controller of H.M.S.O.

ABSTRACTS OF BRITISH PATENTS

Bottle filling machine

A rotary table machine has a push member, with an arcuate extension for guiding vessels into the filler, hinged to an actuating lever above the conveyor belt which feeds the machine. The member reciprocates at 90° to the belt, and blocks the oncoming vessels as it guides one to the filler.—736,741. *Seitz-Werke, Ges.*

Fruit processing machine

A machine, which may be used for removing the plug from a strawberry in the manufacture of jam, incorporates a number of tapered blades pivotally mounted for relative opening and closing movement of their smaller ends. The blades are actuated to be advanced into the fruit, from a position in which their smaller ends are separated, and simultaneously pivoted into a closed position to form a closed conical figure enclosing the plug. The blades are then retracted to withdraw the plug.—736,721. *W. Brierley, Collier and Hartley, Ltd.*

Greening of poultry

The "greening" of freshly killed poultry starts at the vent and can be prevented by freezing the vent, so removing the body heat of the bird. A device to prevent greening consists of an open trough with an L-shaped cross-section and cooling means concentrated near the root of the "L." The trough has a profile which matches in effect the shape of the bird at the vent. When a bird is placed on the trough its vent is pressed by its own weight against the root of the "L," i.e. against the cooled range of the trough. The cooling is preferably by means of tubes through which a cooling medium is circulated.—735,125. *D. P. Toomey.*

Stable condiments

A stable mustard-flavoured condiment is made by mixing an isothiocyanic acid ester with fat and emulsifying the mixture in an aqueous medium. Fat emulsifying agents and stabilising agents may be added. In an example, the product is prepared from the following ingredients, the parts being by weight.

	parts
Hydrogenated vegetable oil	56
Lecithin	1
Allyl isothiocyanate ..	2
Water	150
Starch	7
Salt	3
Turmeric	1

The fatty phase is produced by mixing the hydrogenated vegetable oil, lecithin (which acts as an emulsifying agent) and allyl isothiocyanate. The aqueous phase is prepared by mixing the starch with the water, salt and turmeric and heating to the gelation point of the starch. The fatty and aqueous phase are then formed into an emulsion by passing them through a homogeniser.—734,382. *V. M. Lewis.*

Continuous margarine production

Margarine and similar fat emulsions are continuously produced by heating the emulsion to a temperature above the solidification point of the fat mixture but not exceeding its melting point, so that crystals remain in the mass, and homogenising the emulsion, the crystals being disintegrated by this action and forming nuclei of crystallisation for a subsequent cooling step. Kneading and rolling is not unconditionally required, hence the process shows a saving in energy.—736,710. *Akt., Separator.*

Infant foodstuffs

A foodstuff comprises a nutritive composition derived from cows milk which is normally deficient in *Lactobacillus bifidus* growth-promoting substances, containing, as a supplemental source of such growth-promoting substances, hydrolysed chitin.—736,708. *American Home Products Corp.*

Artificial sausage casings

Sausage casings are made by comminuting fibrous animal material, *e.g.* skin or muscle tissue, to form a paste or dough and extruding the paste through annular extrusion nozzles. The comminution operation is carried out while the material is still fresh and has undergone no chemical changes since the slaughter of the animal, and has not been treated with any protein degradation chemicals prior to the comminution.—736,673. *Anstalt Unda.*

Chocolate coating machine

A curtain of molten chocolate falls from a perforated tray on to articles on a wire conveyor belt, the tray being supplied from a tank beneath the belt by rotating wheels at the side of the belt which delivers directly to the tray through openings in its front wall. A trough collects droppings from the belt and has a roller which forces chocolate through the bottom face of the belt to coat the underside of the articles—736,867. *W. Brindle.*

ABSTRACTS OF FOREIGN PATENTS

Beverage treatment

Alcoholic or non-alcoholic beverages are subjected successively to infra-red irradiation, cooling, electrolysis, cooling, clarification and filtration to improve their taste and effect conservation.—French 985,408.

Drying process

To dry heat-sensitive organic substances, such as milk, fruit concentrates, etc., the sprayed liquid is subjected to the simultaneous action of hot dry air and infra-red rays, the drying time and temperature being considerably decreased as compared with the action of hot air alone.—French 985,058.

Vegetable preserving emulsion

An emulsion for preserving fruits and vegetables is prepared from 500 parts beeswax, 10 parts of sodium hydroxide, 100 parts eosin, 4,000 water, 140 parts of borax, 400 parts of concentrated gelatin solution and 250 g. of Turkey red oil. Fruits or vegetables are immersed in the emulsion at 50° for 5 min. rinsed, then immersed in 1 litre of solution prepared from 100 g. of alum and 100 g. $(AcO)_2Pb$ and dried.—Japanese 4,173.

Soft drink concentrate

A flavoured and coloured syrup concentrate which can be diluted with plain or carbonated water to yield a soft drink is prepared as follows: 240 kg. of sucrose in 120 litres of water containing 5·4 g. of powdered egg-white is boiled, diluted to 150 l., clarified, reboiled and mixed with 1·2 g. of a mixture of lemon-yellow and emerald-green colour together with 1·2 g. of a saffron infusion and 3·6 g. of Busch preservative or 7·2 g. of SO_2. After filtration, 3 l. of an alcoholic lemon extract and 1·5 l. of 6% citric acid are added, followed after 24 hr. by 4444 I.U. ascorbic acid per l.—Spanish 204,483.

EMULSIFIERS

Advita offer a wide range of fatty acid esters, 'tailor made' to the specific requirements of individual manufacturers, including HYMONO, a concentrated G.M.S. with a monoglyceride content of 90%. A complete list of Advita Emulsifiers is available on request. These include :—

HYMONO AND ADMUL (GLYCERYL MONOSTEARATE)
GLYCERYL MONO OLEATE
POLYGLYCEROL ESTERS
GLYCERYL MONO LAURATE

VITAMINS A and D

Advita prepare vitamin dilutions, packed in individual batch size containers, adjusted in their laboratory to meet specific requirements.

DIACETYL and ACETYL METHYL CARBINOL

For the simulation of Butter Flavours

The Advita Technical Service is always at your disposal

ADVITA LIMITED 2 KINGSCOTE ST. LONDON, E.C.4 TEL. CENTRAL 7474

ADL 61-5

The most exclusive Typewriter of its class in the World . . .

The Revolutionary

Everest

Standard Ninety-two . . . **COMPLETELY NEW DESIGN** . . .

Unique controls featuring improvements previously unknown in writing machine development:

- Five interchangeable carriage widths setting and clearing
- 92-character keyboard
- adjustable quick-feed paper injector
- choice of type styles
- automatic margin
- key-set tabulator

T.S. (OFFICE EQUIPMENT) LTD

30 NEW BRIDGE ST., LONDON, E.C.4
Telephone: CITy 1107

PURITY WHL 1877-1955 **COLOUR**

1877-1955

A LONG ESTABLISHED LINK

COLOURS	PURITY
FOR EVERY POSSIBLE FOODSTUFF PURPOSE	TO MEET WORLD-WIDE FOODSTUFF REGULATIONS

address all enquiries to

TELEPHONE HOU 1166 (7 lines)

Williams HOUNSLOW Ltd.

HOUNSLOW • MIDDLESEX

TELEGRAMS WILLIAMS HOUNSLOW

. . . making fast
at Vauxhall . .

We are proud to announce that on 2nd January, 1956 we shall be installed in our new premises at

THE PACKAGING TAPE CENTRE,
VAUXHALL BRIDGE,
LONDON, S.E.11

Telephone: RELiance 7600 (10 lines)

Conveniently situated in the heart of London we shall be able to offer even greater facilities to our customers. Our story of nearly 50 years trading is one of steady growth and even the total destruction of our premises during the war did not check our progress. Now we can justly claim that the first name in tape is the last word in tape.. GOSHERON.

Gosheron Tapes

JOHN GOSHERON & CO, LTD., LONDON

Denton's

DENTOLITE

+ Self-Sterilising +

EMULSION PAINT

The only paint of its kind in the world

"We would like Dentolite Finish, but for this job it need not be self-sterilising."

This is typical of many requests received by us and appears to be the result of a misunderstanding brought about by the very success of DENTOLITE as a germicidal and fungicidal finish.

Actually, DENTOLITE *is* the best quality P.V.A. Emulsion Paint it is possible to produce. It is non-poisonous, free from odour, scrubbable and dries with a beautiful satin sheen. ONE COAT OVER ANY SIMILAR COLOUR GIVES FIRST-CLASS OBLITERATION.

DENTOLITE'S special self-sterilising properties are due to the unique method of manufacture (World Patents applied for) which confers on it the properties of permanently resisting disease-producing germs and mould, making it the PERFECT HYGIENIC WASHABLE WALL FINISH.

DENTOLITE is available in thirty attractive pastel shades AND COSTS NO MORE THAN ANY OTHER FIRST-CLASS EMULSION PAINT.

Shade cards, scientific reports, technical literature, etc., will be gladly sent on request.

Manufactured by the makers of

DENTONAMEL

TRADE MARK

SINCE 1787

DENTON EDWARDS PAINTS

LIMITED

Paint and Varnish Makers for over 160 years

ABBEY ROAD · BARKING · ESSEX

Telephone: Rippleway 1871 (10 lines)
Telegrams: EDLACA, BARKING.

GEARED MOTORS - SPEED REDUCERS

AUTOMATION MEANS ELECTROPOWER GEARS

Unsurpassed for:

* QUALITY
* HIGH EFFICIENCY
* SPEED RANGE
* ALTERNATIVE TYPES
* HORSEPOWER RANGE
* SERVICE
* HIGH SPEEDS
* SLOW SPEEDS
* VERY SLOW SPEEDS
* EXTREMELY SLOW SPEEDS

THE UNIT ILLUSTRATED IS ONE OF MANY TYPES SUPPLIED TO THE FOOD INDUSTRY AS STANDARD EQUIPMENT. WE INVITE YOUR ENQUIRIES

Electropower Gears Ltd

KINGSBURY WORKS, KINGSBURY ROAD, LONDON, N.W.9

Telephone: COLindale 4621-3 Telegrams: LEKTROPOWA, HYDE, LONDON

Craftsmanship in

STAINLESS STEEL

Tailor-made plant and equipment in stainless steel calls for craftsmanship and knowledge far beyond the usual.

Giusti craftsmanship is hard won over many years of experience—it is ready to serve you with the quality of work you need.

Quotations without obligation.

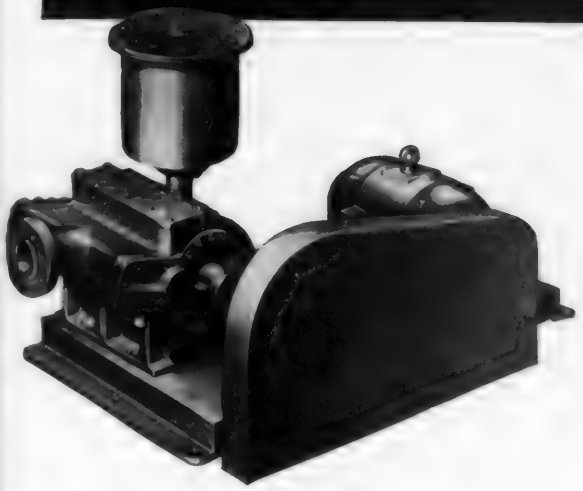
A 2,000 gallon Stainless Steel Storage Vessel—built by Giusti. Its ease of cleaning, crevice free interior and sturdy construction are qualities long associated with Giusti vessels.

GIUSTI

Plant & Equipment Engineers to the Chemical and Food Industries

T. Giusti & Son Ltd. Belle Isle Works, 210/212 York Way, Kings Cross, N.7. Telephone: NORth 5021

Kinney
HIGH VACUUM PUMP
Gas Ballast Type



Speeds production . . . cuts costs

The Kinney D.V.H. 8810 (KDH. 120) Gas Ballast High Vacuum Pump has been re-designed and now incorporates improved features for speedier and cheaper production processing in the manufacture of electric lamps, mirrors, coated lenses, cathode ray tubes, foodstuffs, drugs, coated foils and electrical components. The suction end is now arranged for horizontal instead of vertical suction and has a flanged connection of increased bore instead of threaded type. A mechanical shaft seal now replaces the stuffing box. The overall height of the pump has been reduced and the lower centre of gravity permits higher operating speeds with reduced vibration resulting in a displacement of 130 cu. ft. per minute. Further technical details gladly supplied on request.

GENERAL ENGINEERING

CO. (RADCLIFFE) LTD.

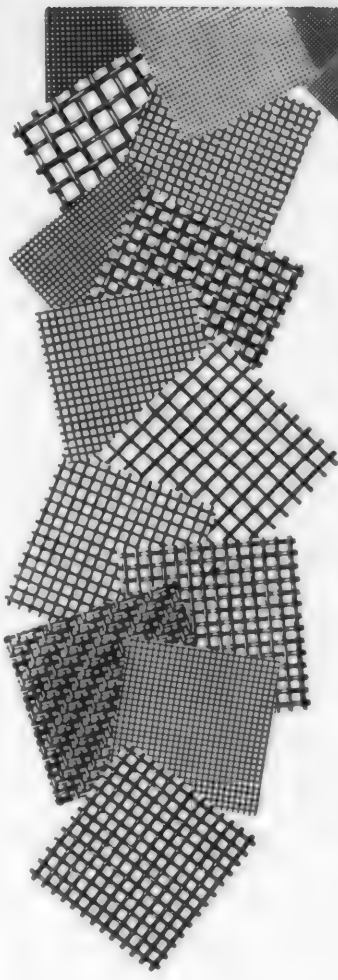
GENERAL ENGINEERING CO. (RADCLIFFE) LTD.

Station Works · Bury Road · Radcliffe · Lancs.

Telephone : Radcliffe 2291 (3 lines)

Telegrams : "General" Radcliffe

London Office : 3rd floor, 9 Victoria Street, London, S.W.1. Tel : Abbey 5278



Any METAL

Any GAUGE

Any MESH-

Made to an almost limitless range of specifications 'Harco' Woven Wire provides a satisfactory solution to all screening and filtering problems.

'Harco' Woven Wire

ensures accurate control of quality, and maximum output over prolonged periods of service.

If desired, 'Harco' Wire Cloth can be supplied in non-corroding metals and alloys.

Please ask for Catalogue No. FD269.

Harvey

G. A. HARVEY & CO. (LONDON) LTD.

Woolwich Road, London, S.E.7. GREenwich 3232 (22 lines)

A little goes a long way . . .

. . . particularly true in the food manufacturing industry where even the smallest amount of dust can spoil a large batch of the product.

The increasing insistence on spotless conditions in food processing works, demands close control of dust at all sources at which it might arise.

This calls for specialised knowledge in the design of extract hoods and systems, in order to avoid the extraction of too much air, with consequent heat loss in winter. It also requires the efficient collection of the dust at the end of the system to prevent any nuisance to the neighbouring locality.

Tilghman's Dust Collectors can be designed to operate continuously and fully automatically, thus eliminating the human element as far as possible, and giving efficiencies of well over 99%.

If you have any problems in this direction, please contact us and we shall be glad to place our many years experience at your disposal.

TILGHMANS LIMITED

W.80

DUST & FUME CONTROL DIVISION

BROADHEATH · ALTRINCHAM · CHESHIRE
ALTRINCHAM 4242/7
LONDON OFFICE: 1 CHESTER STREET, S.W.1. Sloane 0651
AGENTS:
Midlands: R. J. Richardson & Sons Ltd., Commercial Road, Birmingham, 1. Midland 2281
Scotland: Balbardie Ltd., 110 Hanover Street, Edinburgh. Caledonian 3755.
NORTHERN IRELAND W.E. Stewart, 16 Sussex Place, BELFAST

WILLIAM BRYAN LTD

For Finest Quality

PEPPER & SPICES

MACE, NUTMEGS, GINGER, CINNAMON, ETC.

HERBS

KIBBLED ONIONS

VEGETABLE EXTRACT

ONION POWDER

Send your enquiries to:

3 LOVAT LANE
EASTCHEAP, LONDON, E.C.3

TELEPHONE NO.: MAN 1457. TELEGRAPHIC ADDRESS: VOLTZINE, BILGATE, LONDON

TH'S SELF-SEB ... SMI

SELF-SERVICE PACKS within everyone's reach

Dickinson Self-Service packs are within your reach too. Printed in attractive designs, these transparent film packs available in ½-lb and 1-lb sizes, are ideally suitable for packing cereals, dried fruit, etc.

They bring you self-service packaging with an individual character, at a price that could not be obtained in any other way. Ask your usual supplier for details—you'll be surprised to learn how inexpensive Dickinson Self-Service packs are. In case of difficulty, write to :—

John Dickinson & Co. Ltd.

APSLEY MILLS, HEMEL HEMPSTEAD, HERTS.

Telephone: Boxmoor 124

PACKING BAGS FROM PAPER, FILM, FOIL, COTTON, PLIOFILM, POLYTHENE, LAMINATED MATERIALS, ETC. SEAL-EASI BAGS. POWDER POCKETS AND ENVELOPES. FILM, WAXED AND FOIL WRAPPINGS. SEMI-RIGID TRANSPARENT ACETATE CONTAINERS AND WINDOW CARTONS. KARRIER BAGS AND MILLINERY BAGS. HEAT SEALING, GUMMED OR UNGUMMED EMBOSSED SEALS AND LABELS. PACKWELL SEALING MACHINES. HOLDFAST GUMMED PAPER TAPES, GLUED AND THERMOPLASTIC STAY PAPERS. GUMMED AND HEAT SEAL LABEL PAPERS

IT ALL ADDS UP

1 LOWEST POSSIBLE RUNNING COST

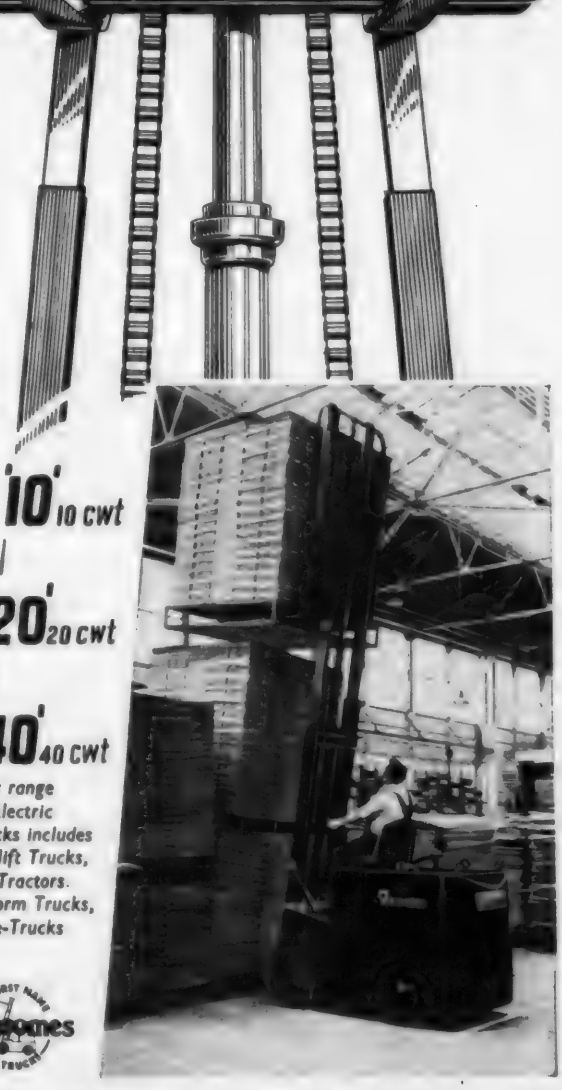
2 LOW MAINTENANCE COST AND MINIMUM OUT-OF-SERVICE TIME

3 MAXIMUM RELIABILITY NO IDLING WHEN STANDING

4 SILENT AND CLEAN NO FUMES NO COLD WEATHER TROUBLES

TO — Ransomes

for the finest of Forklifts



'10' 10 CWT

'20' 20 CWT

'40' 40 CWT

Our range of Electric Trucks includes Forklift Trucks, and Tractors. Platform Trucks, Crane-Trucks

YOUR FIRST NAME IN TRUCKS — Ransomes

RANSOMES SIMS & JEFFERIES LTD

ORWELL WORKS, IPSWICH. *IPSWICH 2201 (6 lines)*

"RED BALL BRAND"

Essences Colours

For the Soft Drinks Industry, Confectionery and the Food Manufacturing Industries

STEVENSON & HOWELL LIMITED

STANDARD WORKS, SOUTHWARK STREET, LONDON, S.E. 1

Telephone: Waterloo 4833 (8 lines). *Established 1882.* *Telegrams: "Distiller, Phone, London."*

Power Performance

MODEL 24–C
30 GALLON CAPACITY
TWO SPEED HEAVY DUTY MIXING MACHINE
BY
HARDAKER

Makers & Designers of Quality Machines For The Food Industry

John T. Hardaker
(FOOD MACHINERY) LTD.
BOWLING IRONWORKS · BRADFORD · YORKSHIRE

A load to lift - a load to move...

...no sooner said than done with a YALE Hand Lift Truck

- Models of YALE Hand Lift Trucks for every type of Pallet and Platform load up to 6,000 lbs.
- Mechanical or hydraulic operation.
- Special YALE safety features.

At the "News of the World" there are many heavy jobs like this for YALE 'Blue Streak' Hand Lift Trucks and Skid Platforms. Some of the YALE trucks were supplied about forty years ago and are still giving first class service — there's reliability for you!

YALE

REGISTERED TRADE MARK

HAND LIFT TRUCKS

Write for Details and Demonstration.

THE YALE & TOWNE MANUFACTURING COMPANY · MATERIALS HANDLING DIV. DEPT. F.M.12 · WEDNESFIELD · STAFFS. · TEL: WILLENHALL 630

"THE STEAMBLOC"

FULLY AUTOMATIC PACKAGED BOILER

FIRST CHOICE IN PACKAGED BOILER PLANT — *A PRODUCT of the BABCOCK & WILCOX ORGANISATION*

TYPES & SIZES. The "Steambloc" is available in a range of types and sizes to meet individual requirements, for evaporative capacities from 1,500 to 18,000 lb./hr. (from and at 212°F.), or equivalent heating output in B.Th.U.

Ask for Publication No. 1628

For every industry requiring steam or hot water for power, processing and heating, the "Steambloc" offers these outstanding advantages —

COMPLETELY SELF-CONTAINED. Compact and space-saving.

RAPIDLY AND EASILY INSTALLED. Delivered as a single unit. Place in position—make water, oil, electricity and steam connections and the *Steambloc* is ready for service.

HIGH OVERALL EFFICIENCY at all loads.

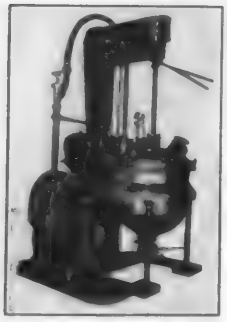
FULLY AUTOMATIC CONTROL—no attendance.

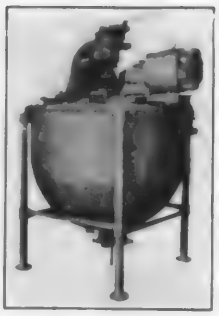
NO SMOKE, no ash, no dirt.

FULL PROTECTION against every eventuality.

SPENCER-BONECOURT-CLARKSON LTD

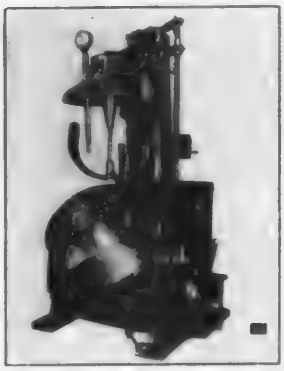
14-15 FETTER LANE, LONDON, E.C.4 · Telephone: FLEET STREET 0481 and 6181

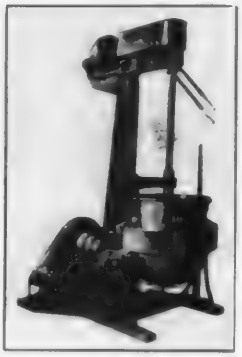




PANS & MIXING MACHINES

A FEW MODELS FROM OUR TREMENDOUS RANGE





FOOD PROCESSING

FRUIT AND VEGETABLE PRESERVING MACHINERY

Consult

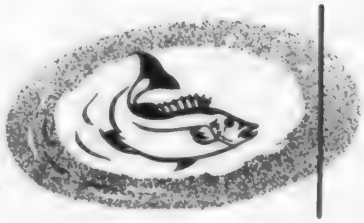
BCH

BRIERLEY, COLLIER & HARTLEY, LTD.
BORO WORKS, ROCHDALE

LONDON OFFICE:
Sunridge, Ruden Way, Epsom Downs, Surrey.

A History of Fish Processing — Ancient and Modern

FISH SAVING



By Charles L. Cutting, B.Sc., Ph.D., F.R.I.C.

Demy 8vo. xv+372 pages. Illustrated. 42s. net. Postage: 8d. Home, 1s. 2d. Abroad.

This book presents for the first time a connected picture of the evolution of the methods of preservation of one of our most important foodstuffs from earliest records up to and including present-day practice, with a glimpse at the future.

Preservation by drying, salting, smoking, canning, chilling, and freezing is dealt with in its historical context, drawing freely on contemporary historical documents and literature. The relationship between technique and social and technological background is brought out in describing the course of development. In dealing with present-day practice a comprehensive picture is given for the first time of the preservation processes involved in the fishing industry with all its ramifications. The author is specially qualified for writing such a unique work since he is Officer-in-Charge of the Humber Laboratory for Research in Fish Technology of the Food Investigation Organization of the United Kingdom Government Department of Scientific and Industrial Research.

Profusely illustrated in black-and-white and colour photographs, mostly reproduced for the first time.

Contents include: Acknowledgements. Preface. Introduction. Antiquity. Fish in Pre-industrial Times. Red Herrings, Bloaters, Pilchards and Salmon. The Rise of the British Herring Fishery. White Fish Salting and Drying. The Canning of Fish. Distribution of Fresh Fish. The Freezing of Fish. Fish Meal and Dehydration. The Future.

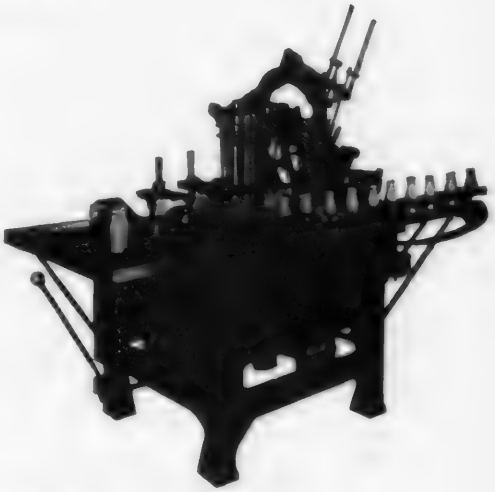
Obtainable through your usual bookseller **LEONARD HILL [BOOKS] LIMITED**
9, EDEN STREET, LONDON, N.W.1. *Euston 5911*

PURDY
LABELLING MACHINES

INVEST IN THE BEST!

"UNIMATIC"

The illustration shows body and all round neck labels being affixed simultaneously to Heinz salad cream bottles. The Purdy "Unimatic" labeller can equally well be fitted to handle round, oval, square and many other shaped containers and to do single or multi-label work, labels, with certain exceptions, being gummed over entire surface to ensure perfect adhesion. The machine, which has a variable speed drive, is fully automatic in operation. Maximum output up to 65 per minute dependent to a great extent on the work handled, estimates being given when samples of such are submitted to us.



THE EXPERIENCE OF HALF A CENTURY IS AT YOUR SERVICE

PURDY MACHINERY CO. LTD.

'Phone & 'Grams: ROYal 8401

ASSOCIATED WITH FARROW & JACKSON LTD.

41-42 PRESCOT STREET, LONDON, E.1

SEALED!

- These scales are fully protected against damp, dust and corrosive gases.
- The floating mechanism is sealed by a unique oil seal.
- All joints are closed by a special composition.
- Scale can even be "hosed down" after use.
- 8 oz. chart in ¼ oz. divisions. Graduated both sides "Light" and "Heavy" for factory use.
- 20 lb. capacity.

Swift Sealed Scales in use at Ross Group Ltd., South Dock, Grimsby.

FOR THAT SPECIAL JOB WITH MOIST FRUIT, WET FISH, POWDERY GOODS

Swift

SEALED SCALES

Please send for full details • Demonstrations any time, anywhere

SWIFT AND SWALLOW LTD., AIRPORT WORKS, ROCHESTER, KENT • TELEPHONE: CHATHAM 3484

Edible Oils and Fats

AND ALLIED MATERIALS

For the Manufacture and Preparation of Food

S. BRAMWELL & CO., LTD.

FOUNDED 1875

4 BROAD STREET PLACE
LONDON, E.C.2
LONDON WALL 5901

PRODUCE EXCHANGE
MANCHESTER, 4
BLACKFRIARS 6311

MANUFACTURERS

British Rayophane Ltd.

WIGTON
CUMBERLAND

* * *

WORLD-WIDE DISTRIBUTION

● TRANSPARENT CELLULOSE FILM ●

MOISTUREPROOF ANCHORED-WATERPROOF & NON-MOISTUREPROOF

HEAT-SEALING-GUM-SEALING AND TWIST-WRAPPING QUALITIES

● REELS & SHEETS (COLOURLESS & COLOURED) ●

RAYOPHANE
FOR
PROTECTION
AND
WRAP-APPEAL

* * *

SOLE SELLING AGENTS

FELBER, JUCKER & CO. LTD.

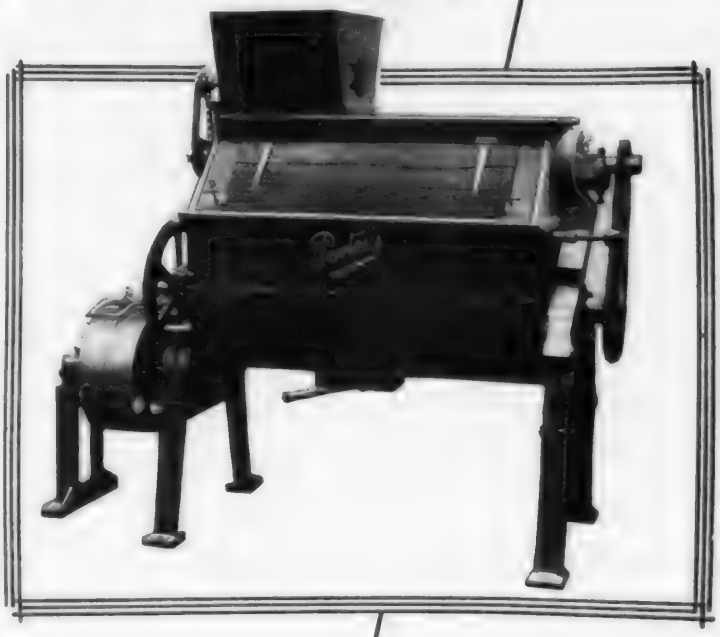
LONDON · Thames House
Queen St. Place, E.C.4
Tel.: CITY 1087 (4 lines)
Grams: Felber, Stock, London

MANCHESTER: 29 Peter Street
Tel.: Blackfriars 3337 (6 lines)
Grams: Felber, Manchester

ATLAS SIFTERS AND MIXERS

ideal for self-raising flour, powders etc.

The highest possible yield with the lowest operational costs combined with perfect blending in the minimum time, make the Atlas Sifter and Mixer a popular choice. Designed by Porteus experts and built by Porteus craftsmen, the Atlas range of Sifters and Mixers represents the very best in economy and efficiency of operation.



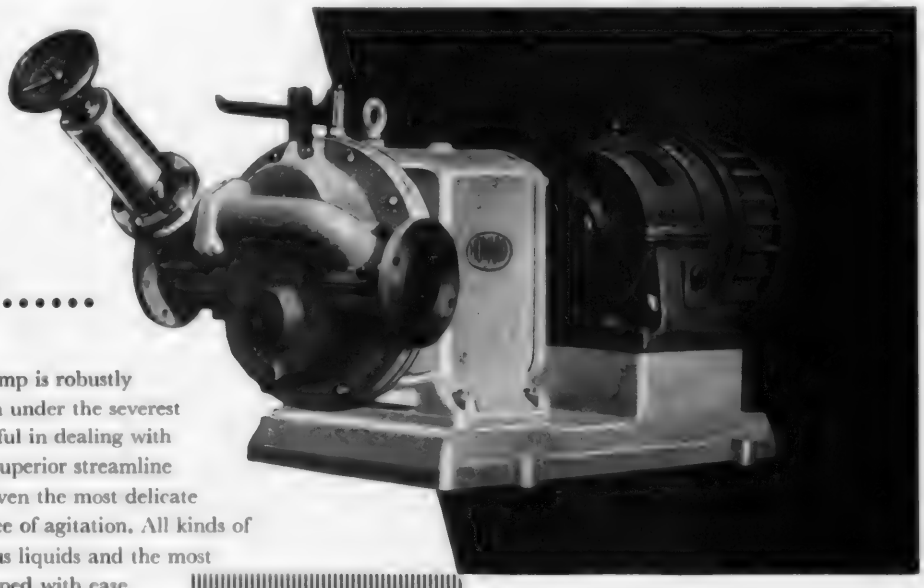
PORTEUS

GEORGE PORTEUS & SONS (LEEDS) LIMITED
LEEDS BRIDGE WORKS · LEEDS 10

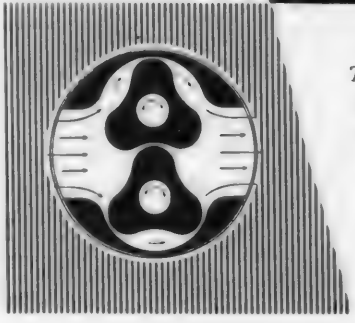
Telephone: 22991
Telegrams: Elevator Leeds

GP 124

Strength with Sensitivity.....



The Howard M Type Rotary Pump is robustly designed for continuous operation under the severest conditions. It's strong and powerful in dealing with thick and viscous liquids, yet its superior streamline action also enables it to handle even the most delicate liquids without the slightest degree of agitation. All kinds of edible fluids, thin or highly viscous liquids and the most delicate of chemicals can be pumped with ease. Operating and maintenance costs are low and the pump can be steam jacketed for heating if required.



There are 7 sizes of Howard M type Rotary Pump for duties from 150 to 20,000 gallons per hour, for heads up to 200 ft.

Please write for our very informative and well illustrated brochure.

Howard

PNEUMATIC ENGINEERING CO. LTD.,
FORT ROAD · EASTBOURNE · SUSSEX

Telephone: EASTBOURNE 1170 · *Telegrams & Cables:* HOWMATIC

Almonds - Walnuts
Desiccated Coconut
Kernels (Hazelnut and Groundnut)
Ginger

T. M. DUCHÉ *& Sons (U.K.) Limited*
GELATINES

Egg Products
Glacé Cherries

Gum Arabic
Agar-Agar

ADELAIDE HOUSE, LONDON *also* GLASGOW & MANCHESTER

CHOCOLATE AND CONFECTIONERY

by C. TREVOR WILLIAMS

Demy 8vo. *239 pages.* *Illustrated.* *25s. net.* *Postage: 6d. Home, 1s. Abroad.*

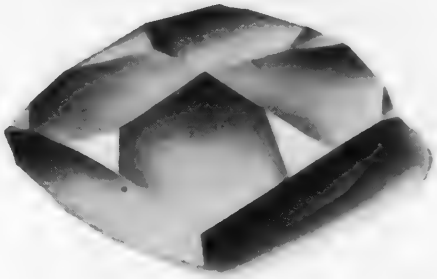
This treatise has been prepared as an up-to-date textbook for technical students undertaking courses in chocolate and confectionery production, as a reference for personnel already engaged in the industry, and as a broad survey for interested plant engineers.

Contents include: A Brief History of Confectionery throughout the Ages. Sugars. Scientific Control. Colloids. Raw Materials. Chocolate and Confectionery Plant. Hard Sugar Goods. Chocolate. Toffees. Caramels and Fudge. Nougat and Marshmallow. Dragees. Lozenges and Cream Paste. Fondant. Pastilles. Gums and Jellies. Marzipan. Fortified Confectionery. Candied Fruits. Factory Organisation. Research. Index.

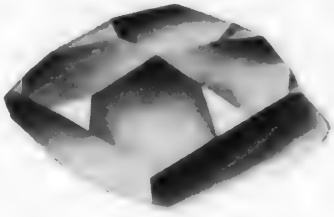
Obtainable through your usual bookseller.

LEONARD HILL [BOOKS] LIMITED, STRATFORD HOUSE, EDEN ST., LONDON, N.W.1

STURGE



CITRIC ACID



JOHN & E. STURGE LIMITED · 1, Wheeleys Road, Birmingham 15 · Midland 1236/7

Manufacturers of fine chemicals since 1823

★ THE NEW JOHN HUNT POWER PASTRY ROLLER

SPECIALLY DESIGNED TO FILL A LONG FELT NEED FOR A MEDIUM SIZED POWER ROLLER CAPABLE OF HANDLING LARGE QUANTITIES OF PASTRY AND YET NOT SO WASTEFUL OF SPACE TO MAKE IT IMPRACTICAL FOR THE AVERAGE BAKER

PRICE £198

CONFIDENTIAL HIRE PURCHASE TERMS CAN BE ARRANGED

- COMPACT DESIGN
- ROBUST CONSTRUCTION
- FULLY GUARANTEED
- WRITE FOR DESCRIPTIVE LITERATURE

EXPERIENCE COUNTS

The John Hunt range of equipment includes "Little Champion" Pie & Tart Machines "Duratax" Cake Mixers, Dough Mixers Electric Potato Peelers etc.

FULL DETAILS SENT ON REQUEST.

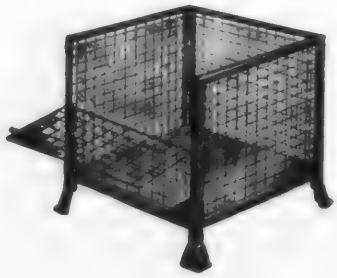
THOUSANDS OF 'JOHN HUNT' MACHINES IN ✳ OPERATION THROUGHOUT GREAT BRITAIN & OVERSEAS.

JOHN HUNT (Bolton) LTD. ALMA WORKS · RASBOTTOM ST. BOLTON · Tel. 5831 Bolton

STAR WELDING CO.
SHEFFIELD

PALLETS & STILLAGES

This stillage is used extensively by food manufacturers.



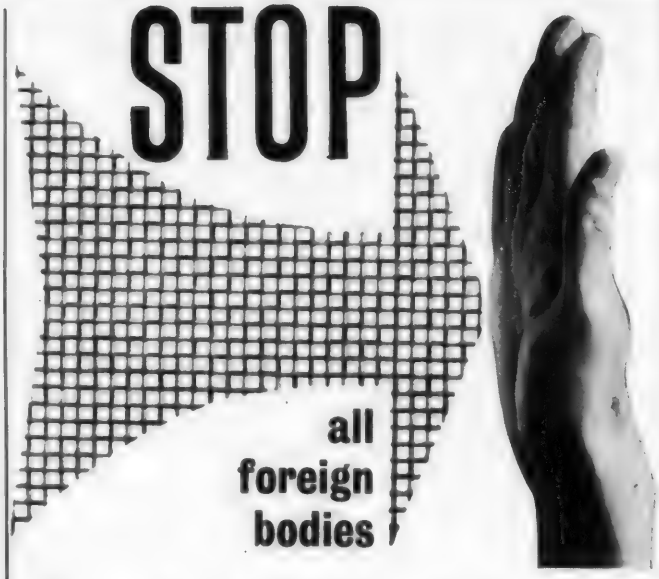
Pallets of all types—flat, post, box, rigid or collapsible

We would like to help you with your pallet and stillage problems. All work is carried out in our own Works—either to your specification or we will gladly make suggestions and design to suit particular requirements. Repair work is also undertaken.

For further particulars—ask for our Representive to call.

STAR WELDING CO.
46 HARLESTON STREET, SHEFFIELD 4
TELEPHONE: SHEFFIELD 27911

STOP



all foreign bodies

in your food products . . . sift them with

"SHIP BRAND"

STAINLESS STEEL WIRE GAUZE

by **BEGG, COUSLAND & CO., LTD.**
SPRINGFIELD WIRE WORKS, GLASGOW, S.E.

BARRON

GRINDING MILLS

Mills for the reduction of all types of materials in food manufacture. Illustrated is our No. 3 size Impact Grinder complete with feeder and suitable for grinding all types of dry materials such as sugar, cereals, roots, spices, etc., to a fine powder. These mills are available in five sizes to deal with capacities of from a few cwts. to 7 or 8 tons per hour.

W. S. BARRON & SON, LIMITED
Phone: 21055 **GLOUCESTER** Cables: Barron, Gloucester

PACKAGED BOILERS

an announcement by

G.W.B. FURNACES LIMITED

As manufacturers of the famous 'Powermaster'— Britain's first complete range of Packaged Automatic Boilers — we are naturally interested to note that other companies have now begun to follow our lead. We believe that there is a very large potential market for the Packaged Boiler and consider that there is ample scope for development in this field.

Before deciding to purchase a Packaged Boiler, however, we do suggest that you compare our specification and consider the following points:

¶ The 'Powermaster' represents ten years of extensive research and experience.

¶ Over 12,000 'Powermasters' have been installed.

¶ Over one quarter of all Packaged Boilers now being supplied in the United States are 'Powermasters'.

¶ Since the heart of any automatic boiler is the burner, the Voriflow burner incorporated in all 'Powermasters' is of particular interest. The air-atomising Voriflow, covered by British Patent No. 717340 with other patents pending, will burn oil, ranging in viscosity from 31-3,600 secs. Redwood 1, or gas, while a combination version permits rapid change-over from one fuel to the other. The Voriflow burner is one of the finest in the world, operating at the highest possible efficiency with the minimum of trouble.

¶ Standard 'Powermasters' are available in 17 sizes, producing 517-250 lbs. of steam per hour F & A 212 F., Models 50-500 operating at a guaranteed efficiency of over 80% on 20-100% capacity.

"STEAM COSTS GO DOWN WHERE POWERMASTER GOES IN"

G.W.B. FURNACES LIMITED

Boiler Division, P.O. Box 4, DIBDALE WORKS, DUDLEY, WORCS. Tel: Dudley 4284

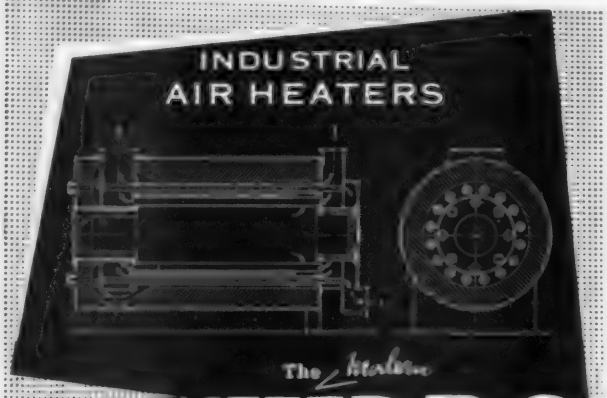
PROPRIETORS: GIBBONS BROS. LTD. AND WILD-BARFIELD ELECTRIC FURNACES LTD.

GWB

Waterwhite and brilliant liquors!
Whenever food industry light-coloured and pure syrups are required
NORIT
Highly Activated Decolourizing Carbon
will give best results. There is a grade to suit every purpose!
United Norit Sales Corporation Ltd., Amsterdam
Representation in United Kingdom
Haller & Phillips Ltd. London E.C.2
14 Wool Exchange Basinghall Street
Telephone MONarch 9041/2

. . . the modern system with the multiple advantages

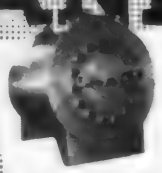
INDUSTRIAL AIR HEATERS



The Modern

ANHYDRO

system



Oil-fired Air Heater - tubular type, as illustrated - for heating air up to 200-250° Centigrade. Also suitable for gas heating. — Special design available for temperatures up to 500° Centigrade. ANHYDRO Air Heaters are designed for drying plants demanding quick, efficient and economical heating of the drying air. Their multiple advantages often justify the expense involved in replacing old air heaters with new ones of the ANHYDRO type.

FULL DETAILS ON APPLICATION

ANHYDRO A.G., ...

EMULIN

IS ACCLAIMED TO BE THE FINEST AND MOST ECONOMICAL

SAUSAGE IMPROVER AND STABILIZER

AN ESSENTIAL INGREDIENT FOR ALL SAUSAGES, CANNED & COOKED MEATS, etc.

Made under strict laboratory control by British Food Chemists with a lifetime of experience
Conforms to all requirements of Food and Drugs Act

Write for further details

MAIN DISTRIBUTORS:

D. F. BLAKESLEY & CO.

87 TURNMILL STREET, LONDON, E.C.1

Tel.: CLE 0192

ARABOL

SELF-ADHESIVE TAPES

Cellulose · Cloth · Acetate
Vinyl Plastic · Polythene
Waterproof Fabric · Paper

for

SEALING - PROTECTION
DECORATION
GOVERNMENT PACKING

THE ARABOL MANUFACTURING CO. LTD.
Wardrobe Chambers,
146a Queen Victoria Street,
LONDON, E.C.4
Telephone: City 2368

CANNING TOWN GLASS WORKS LTD.,
30-34 NEW BRIDGE STREET, E.C.4
Telephone: CENTRAL 5342-5 *Telegrams: DRYAD, LUD, LONDON*
WORKS: CANNING TOWN, E.16 and QUEENSBOROUGH KENT

Seeing is believing...

The importance of industrial hygiene and all that it entails in factory cleanliness was realised by food manufacturers long before their counterparts in other sections of industry. That they should be the first to insist on dustless grinding is therefore hardly surprising but no less commendable for all that. The No. 1 KEK mill illustrated is one of many engaged in grinding granulated sugar to icing. During the operation dust is not merely minimised, it is eliminated. KEK rotary valves on the bin outlets control collection of the product while the air release tubes are enclosed by sheet metal sheaths.

If you are looking for, *Genuinely Dustless Grinding Plant* combining *MINIMUM TEMPERATURE RISE* with *Easy Cleaning* and *Cheaper Maintenance* yet entailing a *Comparatively Small Initial Outlay* then *Contact Kek Immediately*

KEK LTD

PALMERSTON STREET · ANCOATS · MANCHESTER

Manufacturers of Crude Degummed

SOYA BEAN OIL

For prices and particulars apply to :

SOYA FOODS LTD., 40 ST. MARY AXE, LONDON, E.C.3.

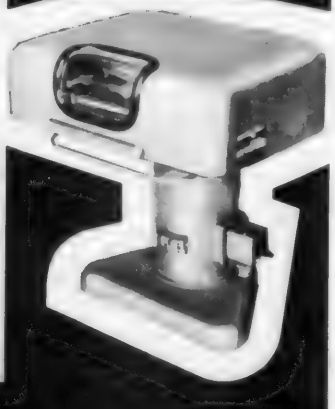
Telephone: AVEnue 4971

novelty

mubir

The clasping machine

for quick, economic and decorative clasping of cellophane bags or of any other transparent material.



Exclusive novelty:
The aluminium clasp is cut off from a feed roll. A bigger or smaller fan is formed at will. Clasps bags up to 1¾ cm. width. Simple handling. Please request prospectus.

Hacoma

Ltd. Bernastrasse 12, Berne
(Switzerland)

MODERN MARKING METHODS

From small hand-operated models to Automatic conveyor line printers.

The unique "EASILOCK" interchangeable rubber type and logotypes are used on all models; different sizes of letters and figures can be used together.

For all marking problems in your packing department consult the MARKING specialists:

MARK-O-PRINT LIMITED

STATION PATH, PUTNEY BRIDGE STATION, FULHAM, LONDON, S.W.6. *Telephone: RENOWN 4135.*

Gums & Resins

DAMAR·MANILA
KARAYA·ACACIA
SHELLAC·BENZOIN
TRAGACANTH

DIRECT IMPORTERS

M. HAMBURGER & SONS

LIMITED

Plantation House, Mincing Lane, London, E.C.3

Telephone: MANsion House 4405 (3 lines) Telegrams: Homacion London

TEMPERATURE CONTROL *in difficult places is easy with*

TEM-CON

ELECTRONIC SYSTEM

TEM-CON Radiation Element

Specifically designed for the control of moving hot surfaces, such as rolls, the TEM-CON Radiation Element is just one example of the specialised application of TEM-CON elements.

Sole Manufacturers and Patentees:

P.A.M. LTD

MERROW·GUILDFORD·SURREY

One of the group of Companies associated with the Southern Areas Electric Corporation Ltd.

ALFRED DODMAN & CO. LTD.

By appointment to Her Majesty Queen Elizabeth II. Engineers.

Telegrams: "Dodman, King's Lynn."

Telephones: 2720 & 2784 King's Lynn.

By appointment to Her Majesty Queen Elizabeth II. Engineers.

HIGHGATE WORKS, KING'S LYNN

Manufacturers of Canning Machinery

including:

PEA VINERS	STEAM CRANES
PEA GRADERS	COOLING TANKS
PEA SOAKING TANKS	MACEDOINE MIXERS
DUO WASHERS	BUCKET ELEVATORS
ROD WASHERS	PULPING MACHINES
SLAT WASHERS	SLICING MACHINES
INSPECTION TABLES	HAND PACK FILLERS
BLANCHERS	CHERRY STEMMERS
PEA BREAKERS	CHERRY DECLUSTERERS
RETORTS AND BASKETS	VEGETABLE PEELING MACHINES

Boilers also supplied to the Canning Industry

LONDON OFFICE: 49 LEADENHALL STREET, LONDON, E.C.2 • *Telephones:* Royal 1759 & 1750

ENAMELLED CHEMICAL PLANT
by
T. & C. Clark & Co. Ltd
Wolverhampton

Clark
CHEMICAL PLANT

Stainless
FOOD HANDLING

EQUIPMENT

Made to requirements in Stainless Steel

The Stainless Steel Bogie illustrated is typical of our wide range of hygienic, non-corrosive and easily cleaned equipment.

Fitments of all kinds, containers, utensils, etc., made to requirements in light or heavy gauge.

"STAYBRITE" STAINLESS STEEL, MONEL METAL, COPPER OR STEEL

LONDON:
7 Grosvenor Gdns, S.W.1
Phone: VICTORIA 1977/8

Associated Metal Works
(GLASGOW) LTD.
30 ST ANDREWS SQUARE GLASGOW C.1
Phone: BELL 2004/6 Grams: "STAINLESS, GLASGOW"

and at LIVERPOOL · MANCHESTER · NEWCASTLE · BELFAST · DUBLIN

A comprehensive work written by 20 leading authorities, giving detailed information on all the important food processing techniques and analytical and laboratory control methods used in food manufacture.

FOOD TECHNOLOGY PROCESSING AND LABORATORY CONTROL

Advisory Editor:
F. AYLWARD
B.Sc., Ph.D., F.R.I.C.

This new book is divided into two parts: (1) PROCESSING METHODS, and (2) LABORATORY CONTROL. The Processing Methods cover Sugar Refining, Sugar Confectionery, Chocolate Manufacture, Jam Manufacture, Edible Fats and Margarine, Flour Milling, Bread-making, Biscuit Manufacture and Cake-making, as well as the subjects of Canning, Refrigeration and Dehydration.

The second part of the book, dealing with Laboratory Control, contains details of routine laboratory tests. Precise information is also given on more accurate tests for legal purposes by public analysts and consultants, and tests used for research purposes. Also included are many illustrations of modern instruments and plant used in the Food Industries, together with a large number of useful tables.

312 pages
103 illustrations

ONLY 21s. net FROM ALL BOOKSELLERS

. . . in case of difficulty 21s. 8d. by post from George Newnes Ltd., Tower House, Southampton Street, London, W.C.2. (Fully descriptive leaflet of this book and others in the NEWNES CHEMICAL ENGINEERING SERIES on request.)

NEWNES

PROTECTIVE PAPERS AND LINERS

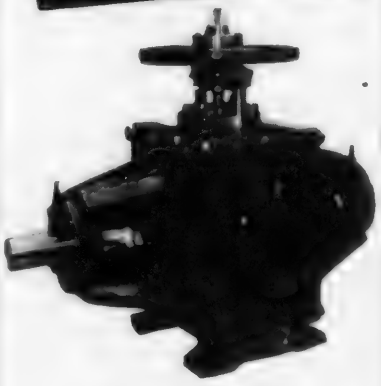
FOR BULK PACKAGING
AND PROCESSING FOODS
MULTIWALL BAGS
PAPER SHAVINGS

W. K. THOMAS & COMPANY
27 JOHN ADAM STREET, ADELPHI, W.C.2

Specialists in British and Imported Papers.

Telephone: Trafalgar 6204-5 *Telegrams: Physack Rand., London.*

PLENTY Rotary Pumps



Suitable for pumping:

Cream
Sugar Syrup
Biscuit mixture
Margarine
Chocolate
Fruit Juice
Vegetable oil
Cheese
Jam
Bakers' dough
Ice Cream

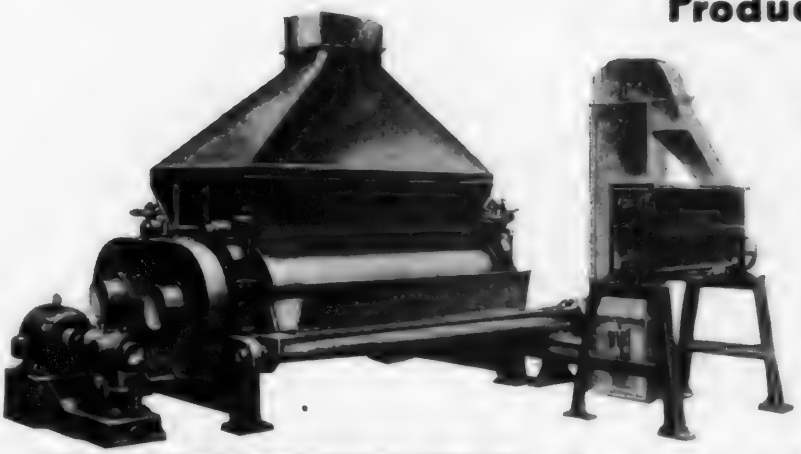
- **Ideal for transfer duties.**
- **Smooth flow without churning.**
- **Suction up to 29 ft. water vacuum.**
- **Up to 350 lbs. per sq. inch for pressure filling.**
- **Infinitely Variable and Reversible.**

Write for full details to:

Telephone: NEWBURY 7
Telegrams: PLENTY NEWBURY
PLENTY & SON Ltd
Marine Engineers & Pump Manufacturers
NEWBURY, Berks.

FM

Produces powders from liquid substances



★ *Illustration shows Twin Cylinder Drying Machine with accessories (optional).*

BERTRAMS

Twin Cylinder Drying Machines

made in four commercial sizes

90 Gallons per hour | 120 Gallons per hour | 180 Gallons per hour | 300 Gallons per hour

and can be arranged in batteries of 2, 3 or 4 machines, with common gross conveyor, elevator and sitter, driven independently. Also Laboratory Machine to handle 10-12 gallons per hour.

Full details will be sent by return post. Please write to:

BERTRAMS LIMITED · St. Katherine's Works · Sciennes · Edinburgh 9

STEEL CLOTHES LOCKERS

ABIX

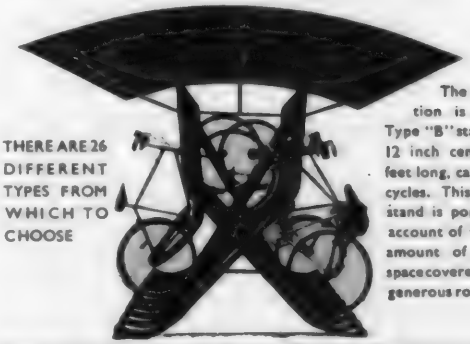
CYCLE STANDS

ABIX Clothes Lockers are of All-Steel construction, with separate hat and coat compartments. Single units or banks of two, three, four or five. Stove enamelled olive green. With lock and plated handles.

SIZE OF SINGLE UNIT:
75" high
12" wide
15" deep

WRITE FOR ILLUSTRATED CATALOGUES TO:

ABIX Cycle Stands are constructed of steel throughout, stove enamelled green. Roof sheeting is normally of galvanised corrugated sheets. If required, sheeting can be supplied in Aluminium, Asbestos or Robertson Protected Metal.



THERE ARE 26 DIFFERENT TYPES FROM WHICH TO CHOOSE

The illustration is of our Type "B" stand with 12 inch centres, 10 feet long, capacity 20 cycles. This type of stand is popular on account of the small amount of ground space covered and the generous roof cover.

OVER QUARTER OF A CENTURY'S EXPERIENCE IN CYCLE STAND MANUFACTURE

ABIX

(METAL INDUSTRIES) LTD
FACTORY EQUIPMENT SPECIALISTS
TAYBRIDGE HOUSE, TAYBRIDGE ROAD
BATTERSEA, LONDON, S.W.11
Tel.: BATTERSEA 8666/7 *Grams: ABIX, BATT, LONDON*

PYPEKOVER

a quicker, cheaper, better way to protect thermally insulated and other pipes

JUST ZIP IT ON AND OFF

This new patented development for covering pipes and ducts consists of Poly-Vinyl Chloride Sheet with a longitudinal "Flexigrip" air- and water-tight fastener.

Pypekover is the ideal hygienic covering for all pipes and ducts. It does not rot or harden and is suitable for temperatures from −60°F to +200°F. Water cannot penetrate to the pipe or lagging even when pipes are washed or hosed. Pypekover is non-inflammable and will not support combustion. Supplied in many colours for identification. Pypekover is cleaner, cheaper and easier to fit than the usual canvas and paint covering and in addition can be removed and re-used. JUST ZIP IT ON AND OFF

A clean, easily washed, water, oil and greaseproof surface for pipes and ducts.

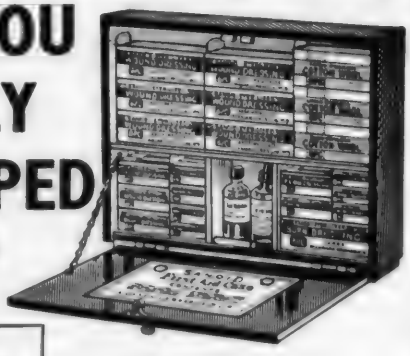
SAMPLE LENGTH
with technical details and prices on request.

Sole Licensees— **VICKERYS** LIMITED

4 LAMBETH PALACE ROAD, LONDON, S.E.1

Telephone: WATerloo 7041-2

ARE YOU FULLY EQUIPPED ????



The First Aid Outfit illustrated is in accordance with S.R. & O. 1938, No. 486 (Standard outfit B) for concerns in which mechanical power is used, and in which the number of persons employed exceeds ten but does not exceed fifty.

Price: A182W—38/6 each, complete; plus carriage.

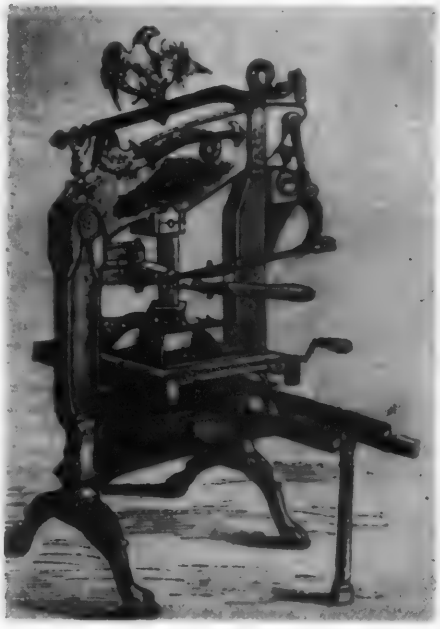
INDUSTRIAL FIRST AID

The Factories Act 1937 stipulates that First Aid arrangements are required in ALL CONCERNS to which the Act applies. Statutory requirements vary according to the number of employees and nature of the work carried out. As Pioneers of Industrial First Aid, established in 1878, we shall be pleased to advise and supply you with the appropriate equipment.

A PRODUCT OF
Cuxson, Gerrard & Co. Ltd.
OLDBURY BIRMINGHAM

MAKING KNOWN

a Study in Publishing



Demy 8vo. **4s. 6d. net.** **34 *pages.***

Making Known **written by the chairman of Leonard Hill Limited, sets out to explain the motives behind the highly specialised business of technical publishing; it is a criticism of the anomalies and misunderstandings which often exist between author, publisher and bookseller; and it emphasises the need and value of partnership.**

The author deals with the relationship of the publisher to the author and the important role of advertising in "making known" the wealth of knowledge, and materials available in this technical age.

The reader will find it written with sincerity, humour and purpose in expounding the ideas, thoughts and aspirations of a publisher on matters important to industrialists and authors.

This book is a valuable guide to technical publishing.

MAKING KNOWN by W. LEONARD HILL

PUBLISHED BY THE STRATFORD PRESS LIMITED · 9 Eden Street · London · N.W.1

Order through your usual bookseller

MOISTURE CONTENT

in 3 Simple Steps that take less than ½ min.

"N.P.L." MOISTURE METER

For rapid and accurate determination of moisture in most solid foods. The meter may be calibrated for a direct reading in one substance, or supplied with charts and arbitrary scale for various substances, including:
BARLEY • MALT • OATFEED • GROATS
SPLIT PEAS • TEA • LENTILS, etc., etc.

Write for Leaflet R105

BALDWIN INSTRUMENT COMPANY LTD. DARTFORD KENT
Telephone: Dartford 2948 (3 lines)

THE FREDK BOEHM EXPERIMENTAL KITCHEN

has evolved many successful new recipes to meet individual requirements and has solved many manufacturers' problems

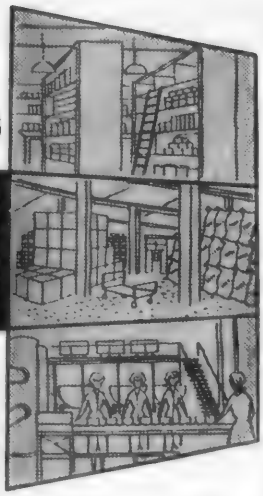
FBL LONDON

PROTEX *Hydrolised protein* | **YEATEX** *Autolysed yeast extract* | **MSG** *Mono-sodium glutamate 99% pure*

Examples of recipes recently evolved include the following:
CREAM OF MUSHROOM SOUP
CREAM OF CHICKEN SOUP
TOMATO SOUP
BAKED BEANS

FREDK BOEHM LIMITED
19 Bentinck Street, London, W1. Welbeck 7933

In Stores Warehouses & Factories



Insect Pests are DEAD AGAINST FUMITE

Simply, safely and efficiently FUMITE DDT/LINDANE smoke insecticide destroys common insect pests in Stores, Warehouses, Factories, and protects timbers against wood-boring beetle attack. Foodstuffs in bulk, bags and original containers may be treated *in situ* at the recommended dosage without fear of tainting. For a few pence for 1,000 cubic feet, FUMITE clears the premises of pests and *keeps* them clear for months.

Quick-acting FUMITE LINDANE is specially recommended in cases where DDT is not acceptable

FUMITE DDT/LINDANE Smoke Insecticide

British Patent Nos. 621732, 621894 and 651684—others pending
Obtainable from Servicing Companies, Sundriesmen Chemists, etc.
Special instruction leaflet from the Sole Manufacturers:

WAECO LTD. (FUMITE DIVISION)
120/2 VICTORIA STREET, LONDON, S.W.1 Tel: *Tate Gallery 9626*

VACUUM EQUIPMENT *for* HAM CANNING

TYPE H

The loading and unloading of cans into drum type vacuum machines and the consequent stacking and unstacking is largely wasted labour.

The TYPE H vacuum sealing machine was designed so that each can may be vacuumised in transit between the dip soldering of the end and packing into the retort. Full visibility, pistol grip solder gun with solder magazine, and a capability of producing a degree of vacuum in the ham-can completely beyond even the theoretical possibility of the drum type machine.

We make a full range of canning machinery. Please write for details

PREMIER FILTERPRESS COMPANY LTD.
GROSVENOR CHAMBERS · WALLINGTON · SURREY

Telephone:	*Telegrams:*	*Cables:*
Wallington 5572	Filtering, Souphone, London	Filtering, London

WHITE FLINT GLASS CONTAINERS OF *Quality*

- Pint and ½ pint Vinegar Bottles, 1 lb. and ½ lb. Jam Jars all to agreed F.M.F. Specifications.
- Prompt delivery from stock.
- Packed in easily handled cartons.
- Wholesale only.

NATIONAL GLASS WORKS (YORK) LTD.
TRADE MARK
HUNGATE YORK TEL: YORK 5127

for

CHOCOLATE WORK

you cannot do better than use

PLEXIGLASS MOULDS
for FIGURES, EGGS, etc.

or

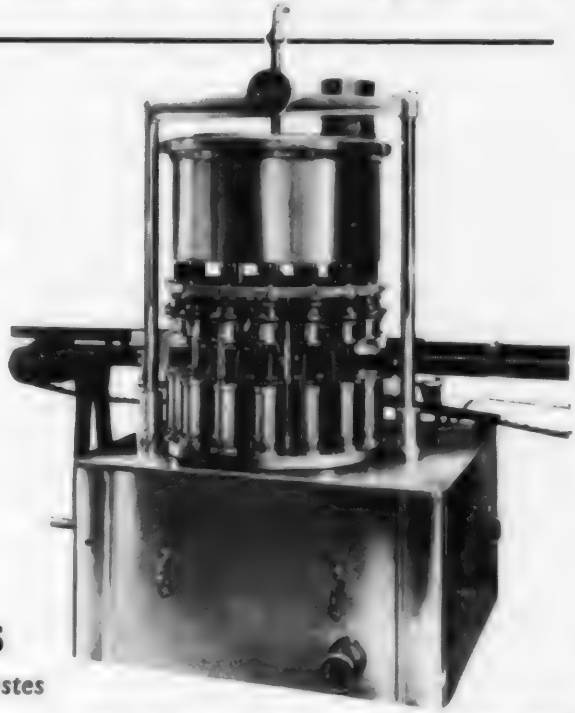
MARCO BAKELITE MOULDS
for SMALL FIGURES and PIECES

Full details and catalogues from

THE CONFECTIONERS' VEGETABLE COLOURS & FRUIT ESSENCES CO. LTD.
MESSINA WORKS, 43A, WHITE POST LANE
HACKNEY, LONDON, E.9
Tel.: Amherst 2274

See ALBRO for Fillers and Cappers

A new 15-head fully-automatic filler for powders



This Albro 15-head full-automatic, vacuum-operated rotary Powder Filler (the first of its kind) is capable of an output of 120 containers a minute.

It is *completely dust-proof*, and designed to eliminate small parts which may be lost or damaged. There are no moving parts in contact with the product.

There is an Albro machine to fill every need. Write for full details of the complete range of fillers and cappers.

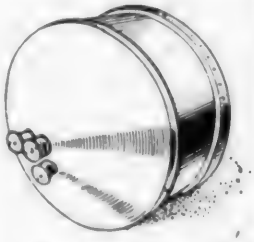
ALBRO Filling Machines

for Liquids, Powders and Pastes

ALBRO FILLERS & ENGINEERING CO. LTD., Wharf Rd., Ponders End, Middx. *Telephone:* Howard 2622. *Telegrams:* Albromach, Enfield

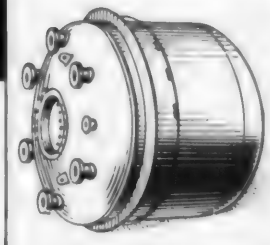
PRESSURE VESSELS *IN MILD STEEL, STAINLESS STEEL AND ALUMINIUM*

FABRICATED METALWORK

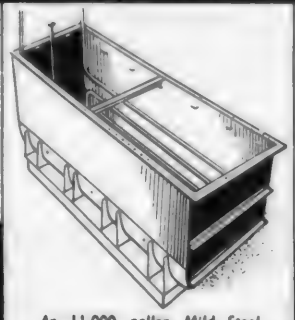


A Storage Vessel made in Stainless Steel; of all welded and fabricated construction. Capacity 1,300 gallons. Diameter 6ft. 6ins. × 8ft. 3ins. high.

Please write for PUBLICATION 1394



One example of a Stainless Steel, all welded pressure vessel. Capacity 1,100 gallons.



An 11,000 gallon Mild Steel Causticiser.

REPULPERS

CAUSTICISERS

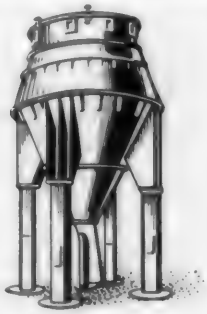
THICKENERS

—FOR EVERY INDUSTRY
—FOR EVERY PURPOSE

Our comprehensive resources include :—
PLATE SHOPS
STRESS RELIEVING PLANT
X-RAY TESTING EQUIPMENT

Paxman

DAVEY, PAXMAN & COMPANY LTD
COLCHESTER · ENGLAND
TELEPHONE: 5151 • TELEGRAMS: PAXMAN COLCHESTER



An all welded and fabricated Mild Steel Vacuum Flotation Machine used for cleaning coal. Diameter 12ft. × 22ft. high.

F.52

Your enquiries are invited for:—

EDIBLE OILS & FATS
(Including HARDENED OILS)
PURE REFINED LARD
SOYA LECITHIN
LOCUST BEAN GUM
GLYCERINE B.P.
AGAR AGAR
and Allied Products

Please contact—

FATOILS LIMITED
91-93 BISHOPSGATE, LONDON, E.C.2
TEL: LONDON WALL 5047 INTL TELEX: 8519
DIRECT IMPORTERS

FULLER HORSEY
SONS & CASSELL

Specialists in the Sale & Valuation of

FOOD MANUFACTURING PLANTS
OF EVERY DESCRIPTION

Since 1807

10 LLOYDS AVENUE · LONDON · E.C.3
TELEPHONE · ROYAL 4861

James Grew & Co. (Eire) Ltd.

54 DAWSON STREET · DUBLIN
Phone: 77003/4 Grams: Grew, Dublin.

AGENTS AND BROKERS TO
FOOD AND DRUG MANUFACTURERS

First class facilities for processing, mixing and packaging Bulk Foodstuffs and Druggists Sundries for the Wholesale and Retail Trades.

LARGE STORAGE CAPACITY

"IN THE FOOD BUSINESS SINCE 1866"

WOVEN WIRE

F. W. POTTER & SOAR LTD.

Our range of Weaving covers all grades from the **FINEST WIRE CLOTH** to the **HEAVIEST SCREENING.**

Also makers of
SIEVES
SCREENS
DRESSING COVERS
TRAYS
BASKETS
and many other Wire Products.

Write for our brochures of Woven Wire and Wirework.

PHIPP STREET
LONDON E.C.2

Telephone · BIShopsgate 2177 (3 Lines)

COMBINED SIFTER AND MIXER

for Reducing, Sifting and Mixing Dry and Lumpy Powders.

Capacities up to two tons.

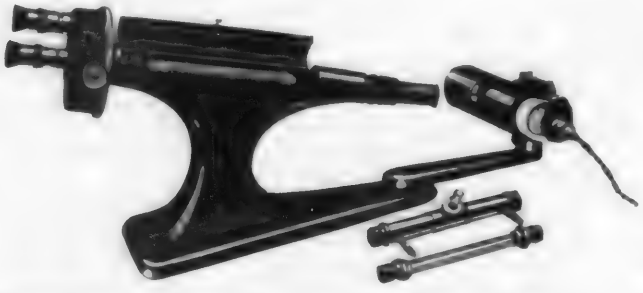
Makers of:
Bucket Elevators
Worm Conveyors,
Separating Sieves,
Friction Sack Hoists,
Sack Cleaners,
Herb Rubbing Machines,
Vertical Mixers

FRANK STACEY & Co., Ltd.
Telephone: Aston Cross 3721 (7 lines)
VAUXHALL STREET
BIRMINGHAM 4

CONVEYOR BANDS
(FABRIC)

MOP CLOTHS
For Fruit Cleaning-Machines

THE KLEENKUT BINDINGS CO. LTD.
89 BARTHOLOMEW CLOSE, LONDON, E.C.1
Tel.: MON 5678/9



PRECISION BS INSTRUMEMTS

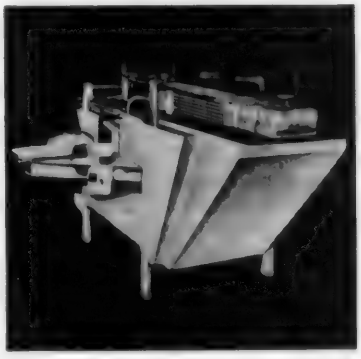
Polarimeter ***Model D***

Angular or angular-and-sugar scales can be provided. For tubes up to 220 mm. length. For use with electric sodium light.

Now fitted with a glass circle and divided drum, replacing the usual verniers.

Bellingham & Stanley Ltd. DEPT. FM, 71 HORNSEY RISE, LONDON. N.19
PHONE: ARCHWAY 2270

"FYNA" AUTOMATIC Wrappers
AUTOMATIC Reel Ovens

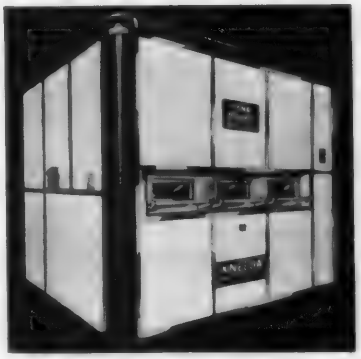


"FYNA" FULLY AUTOMATIC
WRAPPER AND SEALER

Ideal for carton wrapping, cakes, biscuits, bread, pies, etc., in waxed paper, cellulose film, etc. 4 times as fast as hand wrapping. Packages from 5½" to 18" in length, 3" to 7" in width. 15% SAVING IN PAPER.

"FYNA" EQUIPMENT

is already working in Australia, New Zealand, S. Africa, Rhodesia, Uganda, Tanganyika, Kenya, Iraq, Israel, Sudan, Turkey, Eire, Gold Coast, Nigeria, Belgium, Holland, France, Norway, Sweden, Finland, Chile, Uruguay, Canada,
OVERSEAS.



"FYNA" FULLY AUTOMATIC
REEL OVENS

Fired by oil, gas, coke, electricity. For bread, confectionery, biscuits, roast meats, pies, etc. In many sizes, 8 pan to 72 pan capacity.

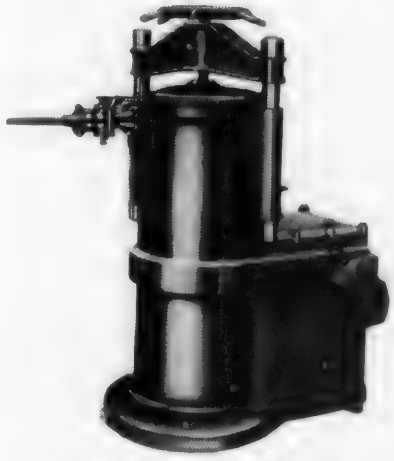
KNEEDA MANUFACTURING CO. LTD.

Phone: FLAxman 8451/2
Cables: Kneedaman London.

132/4 LOTS ROAD, CHELSEA, LONDON, S.W.10

"WETTER" FOOD MACHINERY

We offer a comprehensive range of machinery for the manufacture of Meat Products.



ELECTRIC POWER FILLERS.
Made in 2 sizes.

ELECTRIC POWER MINCERS
up to 5 tons per hour capacity.

ELECTRIC BOWL CUTTERS.
Various sizes.

POWER SAUSAGE & PASTE FILLING MACHINES.

MEAT & PASTE MIXING MACHINES.

MEAT & VEGETABLE DICING MACHINES.

MEAT CUTTING BANDSAWS.

SAUSAGE SKIN SPOOLING MACHINES.

STEAM COOKERS.

STAINLESS STEEL FOOD TRUCKS.

STAINLESS STEEL WORKING TABLES.

Ask for illustrated folder.

J. C. WETTER & CO. LTD., 23 Middle St., West Smithfield, London, E.C.1

Phone: MONarch 8936/7/8

FRESH **FRUIT** AND **PULPS**

Send your enquiries to the **Producers**

THE BEDDINGTON NUT & PRODUCE CO. LTD.

HIGHLANDS HILL, SWANLEY, KENT
Telephone : Swanley Junction 2306/7
Telegraphic Address : "Namsoluc, Swanley Orpington

★ Prompt Deliveries
★ Write for Stock list

STAINLESS STEEL SHEET & BAR

CASHMORES

JOHN CASHMORE LTD., Gt. Bridge · Tipton · Staffs.
Tel: Tipton 2181/5

SM/JC2404

Think of SAFETY FIRST *-then* AIRGUARD

INDUSTRIAL GLOVES
OVERALLS & PROTECTIVE CLOTHING

Safety depends on the best—that is why so many leading industrial concerns repeatedly specify GUARD Protective Wear. We are actual manufacturers.

Please write for illustrated catalogue.

AIRGUARD LIMITED
103 KING STREET, LONDON, W.6
Tel.: RIVerside 3642-3-4-5
and at Birmingham, Glasgow, Cardiff, Belfast, Dublin.
Factory: Rowden Works, Beckenham, Kent.

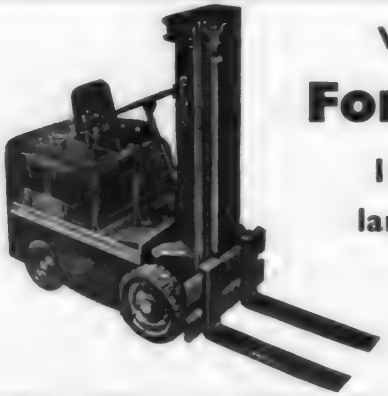
MODERN
WAREHOUSE BUILDING
WITH GOOD LOADING
REQUIRED
IN NORTH LONDON
FOR FOOD MANUFACTURERS
40,000 to 60,000 square feet.

CHAMBERLAIN & WILLOWS
23 MOORGATE LONDON, E.C.2
Metropolitan 8001

FOOD INDUSTRIES MANUAL
Edited by T. Crosbie-Walsh
17th ed. Demy 8vo. 1037 pages. illus. 42s. net.
Postage: 1s. 6d. Home. 2s. Abroad.

Contents: CEREALS, Milling, Flour, Baking, Flour Confectionery. SUGAR CONFECTIONERY, Candy, Chocolate, Jams, Jellies. CANNING AND PRESERVING. MEAT PRODUCTS. PICKLES AND SAUCES. THE DAIRY INDUSTRY. FOOD DEHYDRATION. EDIBLE FATS AND FATTY FOODS. FRUIT JUICE PRODUCTS. STORAGE AND REFRIGERATION. Insulation and Air Conditioning. HANDLING EQUIPMENT. PACKAGING. Materials, Containers, Machinery. BOILER HOUSE. COMPOSITION OF FOODS. Indices.

LEONARD HILL [BOOKS] LIMITED
9 EDEN STREET, LONDON, N.W.1.



WE HAVE THE LARGEST FLEET OF
Fork-lift Trucks for hire
IN THE COUNTRY . . . and we are the largest manufacturers of wood pallets, too!

Youngman

W. C. YOUNGMAN LIMITED, WANDSWORTH WORKS, WANDSWORTH ROAD, LONDON, S.W.8. TELEPHONE: MACAULAY 2233 (4 LINES)

SITUATIONS VACANT

THE Research Division of Chappie Limited, Melton Mowbray, require an Engineer for work on Process Development. Applicants should be in the age range of 25 to 35 and should have a recognised qualification (preferably degree) in mechanical engineering. Preference will be given to those having had experience in a branch of the food industry and having some knowledge of food chemistry. The commencing salary will not be less than £1,000 per annum and the selected applicant will become a member of the Company's Social Security Plan which includes non-contributory pension, life assurance and sickness benefit.—Applications giving details of education and experience to date should be sent to the Personnel Officer.

FOOD Canners in the Eastern Counties require Male Assistant in laboratory for interesting and varied work. Applicants should be over 20 years and possess Higher School Certificate or similar. Knowledge of food chemistry an asset. Good prospects, and good salary according to qualifications and experience.—Box B5156.

EXCEPTIONAL Opportunity occurs with Food Manufacturers of high repute, with expanding turn-over, for keen business man with highest credentials. Should possess proved organising and sales ability. Excellent prospects for right man.—Write details strict confidence to Managing Director, Box B5157.

ASSISTANT Works Manager required for well-known Midlands Food Manufacturing Company. Man with proved experience of personnel control essential, not afraid of long hours as season demands. Good opportunity for man of energy to grow with the business. Replies in strictest confidence, stating full details of present and past employment, salary required, etc. Present staff aware of advertisement.—Box B5159.

MODERN Food Factory in Southern England manufacturing popular brand and rapidly expanding seeks Works Manager, B.Sc., 35-40 years old, expert in processing semi-perishable products. Preferably with knowledge of modern automatic machines and experience in leading female staff. The post involves long hours of work and therefore calls for good health, energy and organising ability. Salary depending on qualifications. Full details in own handwriting. Write in strict confidence.—Box B5160.

ASSISTANT Manager, age 25-35 years required initially to assist in, and subsequently be responsible for, production control in one of the main departments of a large Company in the food industry. Public school education an advantage, together with some technical training in chemistry and works experience, not necessarily in the same branch of industry. Emphasis will be placed on personal qualities including willingness to co-operate as well as ability to lead. Good salary and excellent prospects for advancement; superannuation scheme.—Applications, giving details of age, education, qualifications and experience, should be addressed in the first instance to Box No. 608, Smiths', 100, Fleet Street, E.C.4.

VACANCY for Works Engineer, preferably with experience of preserves, canning and allied trades plant. Good salary for the right man.—Apply Secretary, Frank Cooper Ltd., Oxford.

AYNSOME Laboratories. A young man to train for an important post in the Cereal Section and Test Bakery. A good scientific background necessary. Some knowledge of cereal chemistry an advantage.—Aynsome Laboratories Ltd., Grange-over-Sands, Lancashire.

A WELL-KNOWN English Canner requires the services of an experienced Manager for their Canned Meat Department. Applicants must be fully conversant with all the aspects of preparation and canning of Meats. Please reply giving full details of experience, etc., which will be treated in strictest confidence, to Box B5168.

CLASSIFIED ADVERTISEMENTS

in FOOD MANUFACTURE

MUST BE PREPAID

4d. a word, minimum 10s.

Box numbers, 1s. extra.

Replies to

BOX NUMBERS

should be addressed to

Food Manufacture, Stratford House, 9 Eden Street, London, N.W.1

SITUATIONS VACANT

THE Co-operative Wholesale Society Ltd. require a Deputy Head of its Technical Research Department in Manchester. The appointment offers excellent opportunities and progress to the right man, who should be an experienced Senior Chemist and Analyst possessing an Honours Degree and preferably F.R.I.C. (Branch E). Applications giving details of education, qualifications, experience and salary required should be addressed, in confidence, to the Head of the Technical Research Department, Co-operative Wholesale Society Ltd., Knowsley Street, Manchester, 8.

QUALIFIED Chemist required by rapidly expanding company of Fruit and Vegetable Canners in East Anglia. Experience in quality control and practical experience in jellies, jams, meat packs an advantage. Good prospects.—Write giving age, full details of experience and salary required to Box B5174.

APPLICATIONS are invited from men of wide canning experience, particularly in fish, for the position of Factory Manager with an old established Company. The right man would have every opportunity of rapid promotion.—Replies, which should detail full experience and state remuneration required, will be treated in strictest confidence, and should be addressed to Box B5172.

CHEMIST. Albright and Wilson Ltd have a vacancy in the Technical Service Department for a Chemist to work on the applications of phosphates in Food Products. Duties include investigation into the present uses of phosphates and into new developments. Applications are invited from men and women, preferably with a degree in Chemistry or A.R.I.C., but a lower qualification may be accepted. Previous experience is not essential. A non-contributory pension scheme is in operation.—Applications should be addressed to the Staff Officer, Ref. No. 261, Albright and Wilson Ltd., P.O. Box 3, Oldbury, Birmingham.

STAFFORD Allen and Sons Ltd., require a Technical Representative for the Food and Manufacturing Industries. The position offers scope for advancement and interesting opportunities for direct top level liaison, on development work, between customers and Head Office. This is an important appointment carrying a commensurate salary.—Write stating age, qualifications and experience to the Managing Director, 20/42, Wharf Road, London, N.1.

LONDON Food Canners have vacancy for man, age about 35. Experienced in all aspects of production of Canned Hams, Tongues, Soups, Beans, Meat and Fish Pastes, etc. Supervise and control output under manager. Qualification in Food Chemistry desirable. Permanent pensionable post for successful applicant, with participation in Group Life Insurance Scheme, and possible eventual management. Give full details in confidence of age, education, training and practical experience to Box B5175.

FOOD Processors require Factory Manager for their N.-E. London factory. Small staff of about 50, but scope for expansion and good prospects for right man.—Write full details and salary required to Box B5176.

SITUATIONS VACANT

TRAINED and Experienced Experimental Sugar and Chocolate Confectioner wanted by Meltis Ltd., at Bedford, High Class Chocolate and Confectionery Manufacturers. Duties include assisting in developing new lines and packs and improving existing ones; detailed examinations of and comparisons with competitive products, reports on quality and keeping trials, organisation of tasting tests, etc. The position offered is permanent and pensionable and house available if required. Write in strictest confidence, giving full details of past experience, including present and all past employers, and positions held, with salaries paid, and personal circumstances including age, education, technical training, salary wanted, family, and any other relevant information, to General Manager, Meltis Ltd., Miller Road, Bedford. All applications will receive personal acknowledgement, and expenses of those selected for interview will be paid.

PRODUCTION Manager required for small Sausage and Cooked Meat Factory in London, serving own branches. Man interested in first quality goods only. Private firm. Salary by arrangement. Production bonus paid. Permanent and pensionable post. All letters will be answered and treated in strict confidence.—Write Managing Director, Box B5171.

SITUATIONS WANTED

FOOD Technologist, early thirties, University chemical education. Sound technical and practical background. Seeks technical, managerial, commercial or development post with reputable firm offering opportunity for advancement. Experience plastics and machinery.—Box B5155.

GRADUATE Food Chemist—aged 26—with four years industrial experience, requires position with prospect. Firm making a variety of products preferred but experience to date is limited to milk and chocolate.—Box B5161.

FOOD Technologist seeks post Production Manager. Experienced Soups, Meat, Fish Canning, Alimentary Pastes, Pickles, Sugar and Starch Products.—Box B5167.

AUCTION SALE

By Order of the DIRECTORS of T. G. TICKLER LTD., Due to the Sale of the Property and concentration of production at their other Factories, Messrs.

FULLER, HORSEY,
Sons & Cassell.

have been instructed to offer for SALE by AUCTION in Lots on the Premises, BRENT ROAD, SOUTHALL, MIDDLESEX, on TUESDAY 10th JANUARY, 1956 and following day, at 11 a.m. precisely each day

JAM & FOOD
MANUFACTURING PLANT

including two 400 gallon COPPER AUTOCLAVES; three 275 gallon jacketed COPPER AUTOCLAVES; two 100 gallon per hour HOMOGENISERS; 10 PULPING AND SEIVING MACHINES; 16 CUTTING AND SLICING MACHINES; 47 JELLY COOLING TABLES; SUGAR PRESS BY JOHNSON; 45 stainless steel, copper, and aluminium jacketed BOILING PANS 20 gallon to 100 gallon capacity; LIQUID FILLING MACHINES; 7 Retorts and Sterilizers; 8 Mixing Machines; 6 Jam Filling Machines; 2 Depositing Machines; 3 Purdy World Labelling Machines; 4 Bottle and Jar Washing Machines; 2 Fruit Washing Machines; 10 Fruit Strigging Machines; Stainless Steel, copper and mild steel Pressure Vessels; numerous STAINLESS STEEL items; Tanks and Containers up to 250 gallon capacity; several STEEL BAND CONVEYORS up to 160 ft. long; ASSEMBLY BENCHES for Conveyors; Mechanical Baling Press; Fork Lift Truck; Towmotor; woodworking and maintenance tools; Air Compressors; Electric Motors; large quantity of CRATES; Canteen Equipment; Office Furniture and Equipment and numerous other effects.

Catalogues, 6d. each, admitting two persons on view days (Tuesday, Wednesday, Thursday, Friday and Monday preceding Sale) and one on Sale Days, may be had, when ready, of Messrs. FULLER, HORSEY, SONS & CASSELL, Industrial Auctioneers and Valuers, 10, Lloyd's Avenue, London, E.C.3.

BUSINESS OPPORTUNITIES

INTEREST required in established Manufacturing or Merchanting business, pref. Greater London area. Capital available, £10,000, for sound propos. Details in confidence.—Box B5134.

MANUFACTURERS and Investors. Why not establish a Branch in the Republic of Ireland where strikes are almost unknown and labour is plentiful? Write us your requirements in the matter of factory premises and/or sites.—Grew's Estates Ltd., 54, Dawson Street, Dublin. Tel.: 77003/4. Telegrams: "Grew, Dublin".

IMPORTERS interested in Shelled Prawn, boiled as well as dry salted; Prawn Chutney; Mango Pulp in brine; Mango Chutney; Puppodums; Madras Curry Powder; fresh peeled and sliced Ginger preserved in brine and vinegar packed in teakwood barrels; and general produce from Southern India.—Apply to Eastern Produce Trading Co., P.O. Box 17, G.P.O., Madras.

DE-GREASING and Cleaning Down! One man can do the work of five with B. and A steam-cleaning-with-detergent equipment; ready for use from your own steam supply. "Speedylectric" high-efficiency steam lance; 30 ft. steam hose; 15 ft. detergent hose; £40 complete. Ideal for the Food industry.—Bastian and Allen Ltd., Leaflet L.30, Ferndale Terrace, Harrow, Middlesex.

WELL-KNOWN Scottish Pie Makers can offer attractive terms to Agents with own transport. Goods despatched to any part of the country by passenger train. Branded line, goods packed in cardboard cartons, each containing one dozen.—Trade inquiries to V. C. Pies Ltd. Glasgow. Tel.: Maryhill 1048.

FULL Steam in five minutes with B. and A. Electrode Boilers, used by British industries for twenty years. No boilerhouse, no flue, no attendant needed. The most compact and convenient steam raisers available, can go beside machines using the steam.—Write for leaflet 125, Bastian and Allen Ltd., Ferndale Terrace, Harrow, Middlesex.

COPPER Tubing, 99 lengths by 16 ft. solid drawn. 1⅛ I.D., 1⅜ O.D. Second-hand, in nice condition. 15s. per foot, ex works.—Warrington Canners Ltd., Riverside Works, Penketh, Warrington.

BUSINESS OPPORTUNITIES

RECONDITIONED ex-Army Huts and Manufactured Buildings, Timber, Asbestos, Nissen type, Hall type, etc. All sizes and prices.—Write, call or telephone, Universal Supplies (Belvedere) Ltd., Crabtree Manorway, Belvedere, Kent. Tel.: Erith 2948.

AVAILABLE £1,000,000

An Important Financial Trust has available over £1,000,000 for the purchase of successful Businesses. Any Trade considered. Management can remain. This offers Owners of Private Businesses an opportunity for making forward provision for Death Duties.

REGINALD TERRELL, Managing Director,
BUSINESS BROKERS, Limited
46, St. James's Place, London, S.W.1
(HYD 1678)

TO MANUFACTURERS OF PRE-PACKED FOOD LINES SUITABLE FOR THE RETAIL OR CATERING TRADE

Have you any dormant or slow selling goods that you wish to clear which are taking up valuable space? We are spot cash buyers for any quantity of the above.

Send details to:

MR. R. J. HIBBINS
ANGEL WAREHOUSE CO. LIMITED
ISLINGTON GREEN, LONDON, N.1
CAN. 3247 (10 lines)

(Please mention this advertisement when replying.)

The Strongest Vanilla Flavour
VANOLEUM
1 oz. (2/6) makes a pint of essence
4 ozs. 8/6. ½ lb. 16/6. 1 lb. 32/-
For further details apply:
ARTHUR WHITTAKER & CO. LTD.
30 Church St., Newton Heath, Manchester, 10

PLANT FOR SALE

FOR SALE: Peerless Meat Mincing machine, completely motorised, capacity 1 ton per hour. One Mather and Platt Dicing and Slicing machine, completely motorised, complete with starter, etc.—Box B5164.

FOR SALE: Four Jackstone Frosters, Junior models. In excellent working condition. £500 each.—Please write Box B5165.

HOMOGENISER J.A., 150 g.p.h., maximum working pressure 2,000 lb. per sq. in., belt drive, reconditioned as new, very robust construction.—Midland Dairy Machines, Birmingham, 19.

HOMOGENISERS, several sizes, also stainless steel Tanks, good condition.—Box B5101.

SECOND-HAND PLANT WANTED

WANTED, second-hand Wafer-cutting machine for experimental purposes.—Details and price to Box B5162.

WORLD LIST OF ABBREVIATIONS

Demy 8vo. lx + 261 pages. Price 18s. net. Postage: 6d. Home, 1s. Abroad.

THE WORLD LIST OF ABBREVIATIONS OF SCIENTIFIC, TECHNOLOGICAL AND COMMERCIAL ORGANIZATIONS is the *only book of its kind*, and will serve a useful purpose in bringing easily to hand in one volume all the abbreviations one needs to know. It is of particular interest not only to information officers and librarians, but to all those whose work brings them in touch constantly with the world's learned societies, industrial, research and technical institutions.

LEONARD HILL [BOOKS] LIMITED
STRATFORD HOUSE, EDEN ST., LONDON, N.W.1.

CLASSIFIED ADVERTISEMENT ORDER FORM

RATES—

Situations Vacant, Situations Wanted, Miscellaneous Sales etc. } 4d. per word

Minimum 10s.

Box numbers 1s. extra

.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

FOOD MANUFACTURE, Stratford House, 9 Eden St., London, N.W.1. Tel.: EUSton 5911

Please insert the above advertisement/s for .....insertions. We enclose remittance £ : s. d.

Name.....

Address .....

.....

SECOND-HAND PLANT FOR SALE

ROTARY Drier by Newell, 30 ft. by 3 ft. diam., of $\frac{5}{16}$ in. stainless steel constr. Motorised, with feed and discharge arrangements, and dust cyclone.—Box B5152.

PREMIER Filterpress, model ES/4, automatic vacuum double-seaming machine for round cans. Stationary type. Complete with motor-driven vacuum pump for 3-phase supply. At present arranged for cans 3 in. diam. Max. capacity up to approx. 6½ in. diam. by 8 in. high. Cans hand fed, with automatic lid feed for use with No. 1 vacuum sleeve. Complete with No. 1 vacuum sleeve for cans up to approx. 4 in. diam. by 8 in. high, and No. 2 sleeve for cans up to approx. 6½ in. diam. by 8 in. high. Photo.—F. J. Edwards Ltd., 359, Euston Road, N.W.1.

AVAILABLE owing to re-organisation, 15 Sortex G.2 Electronic Sorting Machines, by Gunson, as new.—Full particulars from Box B5163.

Phone 98 Staines

Two "Cannon" jac. enamelled cyl. enc. Mixers, 30 in. by 36 in., 440/3/50. Cochran Boilers, 2,600, 1,000, 850 evap., 100 w.p. S.S. and chrome Emulsifiers, ¼, ½, ¾, 1 and 2 h.p.; also unused elec. Stirrers, ¼ h.p., all 440/3/50. 2,000 and 500 gall. jac. lithcoted cyl. enc. Vessels. Wood plate Filter Press, 32-30 in. sq. plates. Retorts, 6 ft. by 3 ft. by 3 ft., 10 lb w.p. Spiked Roll Crushers, 18 in. by 12 in. and 14 in. by 3 in. diam. rolls. 1 ton jac. Choc. Mixer. Four-pot Conche. Coffee or Tea Blender, 500 lb. mix. Thirty "Z" and fin blade Mixers up to 38 in. by 28 in. by 31 in. deep. "U" trough and cyl. mixers, disintegrators, pumps, autoclaves, ovens, condensers, refiners, hydros, etc.—Harry H. Gardam and Co. Ltd., Staines.

FOR SALE: One Braibanti Extruder with flour sifter and pre-dryer. Output, approximately 2 cwt. per hour.—Box B5166.

B.C.H. "Speedy" drained Peel-cutting Machine, with stainless steel working parts and feed tray, etc. Complete with motor drive, A.C. 400/440v./3/50.—Box B5170.

"CREAM-MASTER" Whipping Machines. Equally efficient for either pure or synthetic creams. Let us send you details.—Sorensen's, 42, Raby Street, Manchester, 16.

250 and 500 gall. stainless steel Tanks with agitators; Benhil Butter and Margarine Packer; pasteuriser, ovens, mixers, kneaders, racks, provers, baking sheets, etc. Your enquiries welcomed.—Sorensen Bakery Equipment Ltd., 42, Raby Street, Moss Side, Manchester, 16. Tel.: Moss Side 2054.

"CHOCO-MASTER" Enrobers and Covering Chocolate. Please ask for full details.—Sorensen's, 42, Raby Street, Manchester, 16.

HOBART Mixers, 80 qt., 30 qt., 20 qt. (bench). Pelkman 30 qt., Peerless 20 qt. (bench) Mixers. B.C.H. copper jacketed Mixer, 25 gall., geared. Crollie Flour Blender, Elevator and Sifter. Artofex 1½-sack Dough Mixer.—Welding's, Saxone Buildings, Tarleton Street, Liverpool, 1.

PFAUDLER 200-gall. glass-lined Tank. Premier 5-in. high-speed Emulsifier. Roberts Bottle Filling Machines, vacuum operated. Rose multiblade and Berkel single-blade Bread Slicers.—Welding's, Saxone Buildings, Tarleton Street, Liverpool, 1.

MARMALADE and Preserving Plant for Sale. Kellie and Whites Quartering, Peeling and Separating Machines, belt and motor drive. B.C.H. "Turnbull" Peel Chipping Machine with stainless steel working parts and automatic belt feed. B.C.H. "Speedy" Drained Peel Cutting Machine with stainless steel working parts. B.C.H. 15-in. and 8 in. diam. stainless steel Pulping Machines. B.C.H. 40-gall. copper tilting steam jacketed Boiling Pans. Duckworth automatic Jam Filling Machine. Swallow 25-in. diam. latest type motorised Bowl Chopping Machine. Alite Mincemeat Filling Machine. B.C.H. stainless steel and copper Jam Bogeys. Purdy automatic and semi-automatic Bottle Labelling Machines.—C. Skerman and Sons Ltd., 118, Putney Bridge Road, London, S.W.15. Tel.: Vandyke 2406.

ASCOLI fuel-less cooker for sale. New condition, only used 2/3 times. Large capacity. Warrington Canners Ltd., Penketh, Warrington.

SECOND-HAND PLANT FOR SALE

TWO excellent Gardner 5-cwt. size Combined Sifting and Mixing Machines, One revolving drum-type Horizontal Mixer, 3 ft. 9 in. long, 6 ft. 4 in. diam., and 7 h.p. A.C. motor. Can be used for tea, dry powders, granular materials, seeds, etc.,—Frank Stacey and Co. Ltd., Vauxhall Street, Birmingham, 4.

Reconditioned Labellers

as new . . .

Purdy Automatic and Semi-automatic.
Bratby & Hinchliffe Automatic.
Flowers Semi-automatic.
Banks Automatic.
Can Labellers.

Labellers always in stock

C. SKERMAN & SONS LIMITED

118 Putney Bridge Road, London, S.W.15
Established 1875 Telephone: VANdyke 2406/7

MISCELLANEOUS SALES

CHICKEN Fat, rendered and in large cans, for sale.—Box B5153.

VATS, wooden, two for sale, one unused, approximate capacity 500 gall. each. Height 3 ft. 6 in., diam. 6 ft., outlet tap in base 1½ in. to 2 in., thickness of timber 2 in., bands four ½ in. round steel adjustable, bands two ½ in. by 2 in. steel hoops non-adjustable. Circular wooden covers for each. Offers invited.—S. J. Palmer (N/C) Ltd., St. Crispin Buildings, Low Friar Lane, Newcastle upon Tyne, 1. Tel.: 20873 (Newcastle).

FACTORY or Storage Premises for sale. 10,000 sq. ft., single storey, excellent condition, ideal for food storage, all services. Suite of offices. Near centre Cheltenham, Glos.—Box B5158.

ITALIAN Nuts finely ground (arachid and almond and hazel nuts), packed 112 lb. new bags, available. Enquire for samples and quotation indicating quantities required.—The Oilcakes and Oilseeds Trading Co. Ltd., City-Gate House, London, E.C.2.

HIGH Quality Wheat Gluten (South American and Australian). Always available.—The Oilcakes and Oilseeds Trading Co. Ltd., City-Gate House, London, E.C.2.

WINE Lovers, amateur wine makers. Ensure success of your parties. Make your own high-grade wines from our Spanish Highly Concentrated Grape Juices. Guaranteed quick results. Inexpensive. Instructive hobby.—Write Hidalgo Ltd., Market Place, London, W.1.

JARS for Sale: 500 gross, 1½ oz., Barrel Paste Pots, Phoenix top, light weight; 1,000 gross, 2½ oz.; 1,000 gross, 1½ oz., Tapered, Ribbed, with label space; cheap to clear; room wanted. 100 gross, 1½ oz., B.F. Earthenware Pots, Bowl shape, Phoenix top; could be used for jams, pastes and egg cups; all in new condition; packed in original parcels; offers invited. 1,000 gross, assorted 53 mm. and 63 mm. red, green, yellow plastic Screw Caps, with or without wads; cheap to clear. 100 gross, 5 dram Essence Bottles cm., first reasonable offer.—Box B5173.

FOR SALE: Factory, main Stirling-Carlisle route, 6 miles Motherwell, three storeys, 12,000 ft., sound floors, suitable for Food Manufacture, Storage. 1 acre goods yard. Good living rooms. Assessment £75.—Box B5169.

MISCELLANEOUS WANTS

DAMAGED or redundant stocks of food, residues or by-products in large or small quantities required.—Send your offers to Rotunda Foods Co., London Office: 50/52, Blandford Street, W.1. Tel.: Welbeck 8465.

SECOND-HAND Tins. Large quantities of ex M/F Frozen Whole Egg type tins wanted weekly. Size 12 in. by 6 in. by 6 in.—Warrington Canners Ltd., Penketh, Nr. Warrington.

MEDICAL bottles; tablet bottles; jars; bottle closures, bakelite and metal purchased. Best prices paid.—Samples and full details in first instance to Noel Davold and Co., 9, Laurence Pountney Lane, Cannon Street, London, E.C.4. Tel.: MANsion House 3951-2.

MISCELLANEOUS SALES

ESTABLISHED manufacturers invite enquiries for genuine Worcestershire Sauce at 13/6 gall., ex works.—Tamar Indien, Harders Road, Peckham, S.E. 15.

PEANUT KERNELS

Hand Picked and other Grades.
Spot and forward always available.

THE OILCAKES & OILSEEDS TRADING CO. LTD.
City-Gate House, Finsbury Square, London E.C.2
Tel.: MONarch 9533

SODIUM Alginate, Lecithin, stocks held by direct importers.—L. E. Pritchitt and Co. Ltd., Hatch End, Middx. Tel.: Hatch End 2334.

HAND TRUCKS, tubular steel, remarkably light and strong. Pneumatic tyres. Roller bearing wheels. Platform, 5 ft. 4 in. by 2 ft. 9 in. Carrying capacity 10 cwt. £14 2s. 6d. Immediate delivery. Write for illustrated catalogue.—Sterling Pump Co. Ltd., Spalding. Tel.: 2404.

DRIED VEGETABLES
DRIED HERBS
SEEDS & SPICES
GROUND PAPRIKA

•

AGRICULTURAL AND CHEMICAL PRODUCTS LTD.
51 & 52 BARBICAN, LONDON, E.C.1
Telephone: Monarch 6124-6 (3 lines)

DRIED MUSHROOMS
Frequent shipments. Competitive prices.
Mushpro Ltd. 2a, Ashdown Street, London, N.W.5.

DRAKESONS
GENERAL METAL SPINNERS
CAPACITY UP TO 72" IN ALL METALS

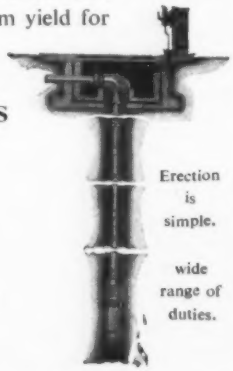
SPECIALISTS IN HEAVY GAUGE HYDRAULIC SPINNING
SHEET METAL ENGINEERS

21 PARKHOUSE STREET, CAMBERWELL, LONDON, S.E.5. RODney 6060 and 6062

Trade **Pulsometer** Mark

SUBMERSIBLE BOREHOLE PUMPS.

A compact multi-stage highly efficient unit for boreholes where the maximum yield for size of well is required.



Erection is simple.

wide range of duties.

AGRICULTURE AND DAIRIES
WATERWORKS
INDUSTRY
DRAINAGE
HOSPITALS · HOTELS
OFFICES AND LAUNDRIES
FIRE AND EMERGENCY

Designed for use in boreholes from 6-in. diameter.

List No. 3392.

Pulsometer Engineering C° L^td^.,
Nine Elms Ironworks, Reading.

Tel: Reading 67182/5.

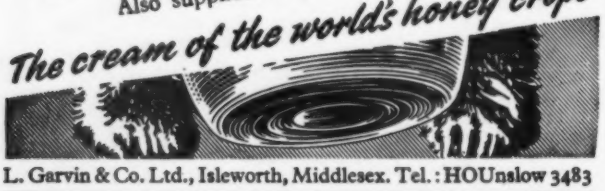
London Office: 39 Victoria St., S.W.1. *Tel:* Abbey 4565.

For Bulk Supplies insist on

BEAR Brand HONEY

Available in 7 lb. and 56 lb. tins and in barrels.
Also supplied in ¼ lb. and 1 lb. jars.

The cream of the world's honey crops



L. Garvin & Co. Ltd., Isleworth, Middlesex. Tel.: HOUnslow 3483

BRETTIN

REGD.

FOR 'SNAP' RELEASE

THE WORLD'S BEST EDIBLE EMULSION
FOR BREAD & CAKE PLANT TIN GREASING

OVERSEAS TRADE ENQUIRIES INVITED

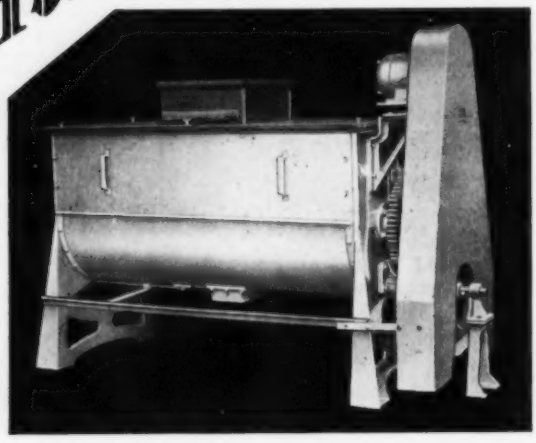
LONDON OIL CORPORATION LTD.

CAMBER WORKS · CAMBERWELL GROVE
LONDON · S.E.5

L7445A

Alite

A Robust Mixing Unit for High Output at Minimum Cost Compatible with Maximum Efficiency in a Range of Sizes to Suit Practically All Requirements



The Alite Powder Mixing Machine

ALITE MACHINES LTD

Manufacturers of Filling, Sifting and Mixing Machines

PIXMORE AVENUE, LETCHWORTH, HERTS

Telephone: Letchworth 965-6

EDICOL SUPRA COLOURS

for CAKES, BISCUITS and WAFERS

Edicol Supra Colours meet the highest standards of purity demanded by the most stringent regulations in the world.

Their purity is protected by delivery in sealed packages.

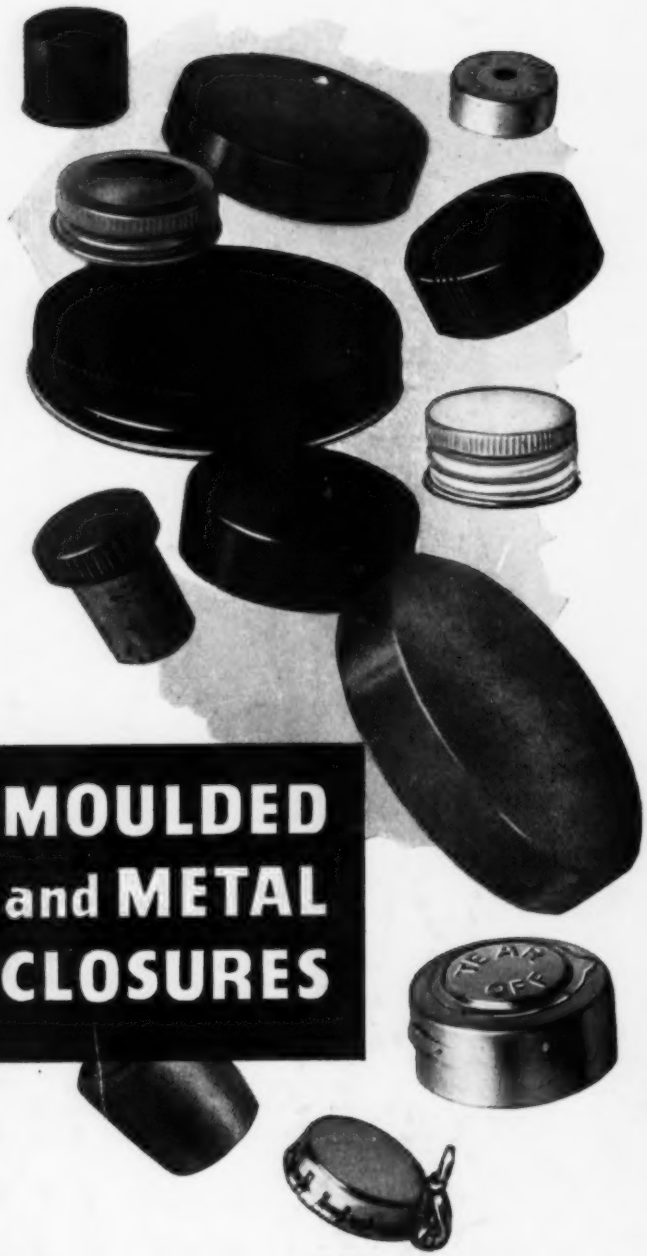
" Certified " supplies of many are available for food processors exporting to the United States.

Technical literature and full information on request

IMPERIAL CHEMICAL INDUSTRIES LTD LONDON SW1

D.525

Let's go selling with



MOULDED and METAL CLOSURES

AN efficient closure can also be attractive and vital in the sales appeal of the whole package.

We can design and supply plain, fully decorated tin-plate or aluminium closures, cork stoppers and plastic caps from black to the most delicate pastel shade, with exquisite embossing.

When the contents of the container have been used and the label washed off, a distinctive closure will go on telling your story.

UGB
CLOSURE DIVISION

UNITED GLASS BOTTLE MANUFACTURERS LTD

8 LEICESTER STREET, W.C.2. *Telephone:* GERRARD 8611 (18 LINES) *Telegrams:* UNGLABOMAN, LESQUARE, LONDON

Printed for the Proprietors, LEONARD HILL LIMITED, and published by them at their Offices, Stratford House, 9 Eden Street, London, N.W.1
by Billing and Sons Ltd., The London Printing Works, Guildford and London, England
Registered for Transmission to Canada including Newfoundland